

A NOTE ON THE MOVEMENT OF BIGEYE TUNA BASED ON TAGGING EXPERIMENTS

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SUMMARY

The movements of young bigeye tuna in the eastern tropical Atlantic is analyzed based on tagging experiments. Fish released in the Gulf of Guinea show northwest- and southeastward movements along the coast. In contrast, those fish released off western Africa show relatively small-scale north-south movements around the tagging area and do not migrate into the Gulf of Guinea.

RESUME

Les déplacements de thon obèse juvénile dans l'Atlantique tropical oriental sont analysés à partir d'expériences de marquage. Des poissons marqués dans le golfe de Guinée montrent des déplacements vers le nord-ouest et le sud-est le long des côtes. Par contre, les poissons marqués au large d'Afrique occidentale montrent des déplacements nord-sud relativement peu étendus aux alentours de la zone de marquage, sans migration dans le golfe de Guinée.

RESUMEN

Se analizan los movimientos del patudo juvenil en el Atlántico tropical oriental en base a experimentos de marcado. Los peces liberados en el Golfo de Guinea se desplazan hacia el Noroeste y el Sudeste siguiendo la costa. En contraposición, en el caso de los peces liberados frente a la costa Oeste de Africa se observa un desplazamiento relativamente escaso hacia el Norte y hacia el Sur alrededor de la zona de marcado y no emigran al Golfo de Guinea.

INTRODUCTION

According to ICCAT (1985), the total catch of bigeye tuna in the Atlantic has increased to the level of over 60 thousand metric tons since 1980 which is more than 20 % of the average during 1975-79. Although it was reported that the bigeye stock has been highly utilized in recent years (ICCAT 1986), the biology of this species, for instance growth, migration, maturity, and stock structure, has not been well known. It was decided that SCRS in 1986 should place higher priority of research on these subjects (ICCAT 1986).

In this paper, the movements of bigeye tuna around the Gulf of Guinea are estimated based on the recapture data obtained from the tagging experiments conducted after 1978.

MATERIAL AND METHOD

Recovery data used in this study consist of 509 fishes released by Cape Verde, Senegal, Ivory Coast and Japan in the year of 1978, 1980 and 1981. Those data except Japan were obtained from CRO Dakar and Abidjan through the courtesy of Dr. A. Fonteneau and Dr. F. X. Bard, respectively. With regard to the Japanese data, bigeye taggings were also undertaken during International Skipjack Year Program (ISYP). The details of ISYP tagging activity are given by Kume (1981) and Yamaguchi and Kikawa (1982).

Release areas are roughly divided into 3 waters, central, eastern waters of the Gulf of Guinea and off western Africa (off Mauritania and southwest of Senegal), which are shown in Fig. 1. The month of tagging and the number of tagged bigeye tuna recovered by release area are shown in Table 1.

Fig. 2 shows the length frequency of recovered fishes at the time of release by area. The smallest are those fishes released in the central area of the Gulf of Guinea ranging 380-500 mm in fork length and the largest are those released in the area off western Africa (400-800 mm). Fishes released in the eastern area of the Gulf of Guinea are in-between of the two (400-600 mm). Out of 509 recoveries, 404 data with confirmed recovery position were used to

estimate the movement of bigeye tuna.

RESULTS AND DISCUSSION

All the release-recapture data are illustrated in Fig. 3. Recoveries are obtained from 20° N to 20° S in latitude and from 15° E to 35° W in longitude, mostly along the coastal waters of Africa. Figs. 4 (1)-(3) show the release recapture data by release area which moved more than 500 km. The number in that figure denotes the month and the position of recapture.

Although long-term recaptures are recorded for the fishes released in the area off western Africa with more than 300 days at liberty, few were recovered in the far outside of the release area. The southwestward movement is observed in the area off Mauritania, and the reverse direction, northeasterly, is observed for the fishes released off southeast of Senegal. There are too few recoveries to estimate the seasonal movement in this area. However, north-south migration might be assumed as in the case of skipjack (Miyabe and Bard 1986). It is noteworthy that there was no recapture from the inside of the Gulf of Guinea among the fishes released in this area.

Bigeye tuna released in the central area of the Gulf of Guinea shows active movements towards west or northwest and towards southeast. Especially the former exhibits more extensive moving to off Abidjan during September to November which is 2 to 3 months after the tagging, and in the farthest case to around 4° N and 20° W. After next April and on, bigeye tuna were recovered in the more northern waters off Mauritania. The southeastward movement seems to start just soon after the release, in August and September, extending to next June. Most recoveries came from around off Port Gentil. Only one fish was recovered from south of 5° S (south of Luanda 12° S, 13° E) in September after more than 1 year at sea.

Those fishes released in the eastern area of the Gulf of Guinea show similar movements as those released in the central area; i.e., northwest- and southeastward movements. During June to August recoveries began to be obtained from the waters around 0° and 5° E indicating northwestward movement, and

then moved to coastal area extending from off Accra to Abidjan in the months of July to November. Some fishes were recovered in the coastal waters of western Africa. The largest distance moved (about 4,900 km) was recorded from the fish recaptured at 5° N and 35° W with 441 days at liberty. The number of recoveries which moved southeast was fewer than the other direction. Only 4 fishes were recovered in the coastal waters off Angola during May and October.

From the above, it is observed that there is a difference of the bigeye migration between fishes within and outside the Gulf of Guinea. Fishes in the offshore waters of western Africa seldom migrate into the Gulf of Guinea, and show relatively small scale north-southward movement. On the other hand, those released in the Gulf of Guinea undertake extensive migration towards northwest and southeast, and especially it is interesting to note that in the central waters of the Gulf of Guinea few fishes appear to remain. Small fishes (400-600 mm) in the Gulf of Guinea migrate into off western Africa and Angola with their growth. The former movement of bigeye is also shown by Bard and Amon Kothias (1986), which summarized the tagging results done by Ivory Coast during 1983-1984. In addition, they indicated that one of tagged bigeye tuna released off southwest of Abidjan was recovered in Azores waters 7 months later. Based on this fact, it can be said that some fishes make more larger-scale migration than those observed in this study. With respect to the migratory difference of bigeye tuna noted above, the difference of the fish size at release (Fig. 2) may be related. However, it is rather difficult to explain by this since Fig. 2 shows the overlapping of the fish size among the areas.

Recovery data used in this study were obtained through surface fishery except that one fish was confirmed to be recovered by longline. The size at recapture is mostly smaller than 1,000 mm, so that the information on movement obtained in this study is limited for young bigeye tuna in the eastern tropical area. From the managerial point of view, the better understanding of the biology is essential for that purpose. It is, therefore, needed to undertake more tagging experiment in the various waters using various gears in order to enhance the current knowledge on the migration of this species.

LITERATURE CITED

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Table 1. The month of tagging and the number of tagged fish recovered by release area.

Release area	Year	Month	Number of fish
Off Mauritania	78	June	103
	80	Aug.	7
Southwest of Senegal	81	Oct.	23
Central area, Gulf of Guinea	80	July-Sep.	90
	81	July-Aug.	38
Eastern area, Gulf of Guinea	80	Aug., Dec.	11
	81	Jan., Mar.-June	237

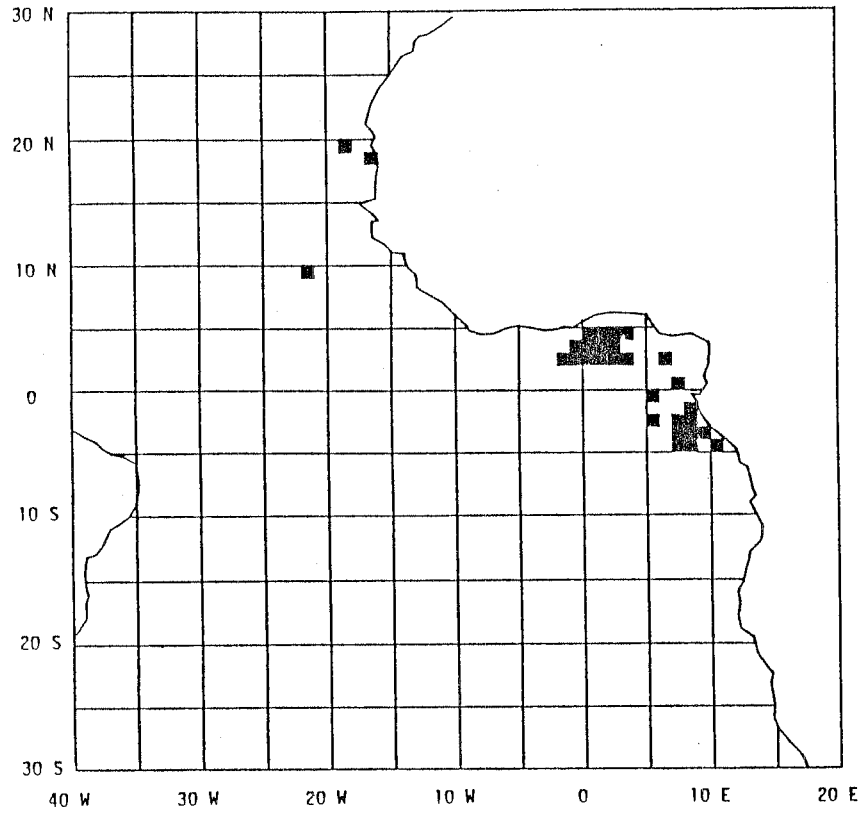


Fig. 1. Areas (1-degree square) where recovered fishes were released.

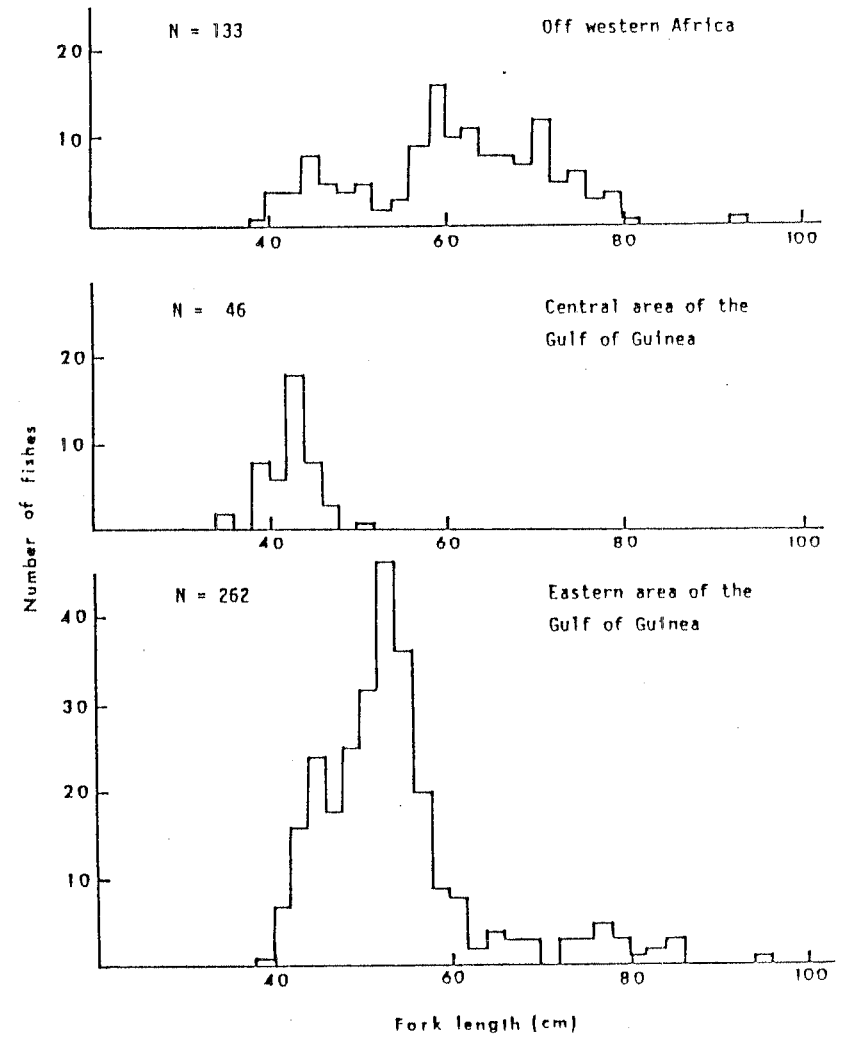


Fig. 2. Length frequency of the recovered fishes at the time of release.

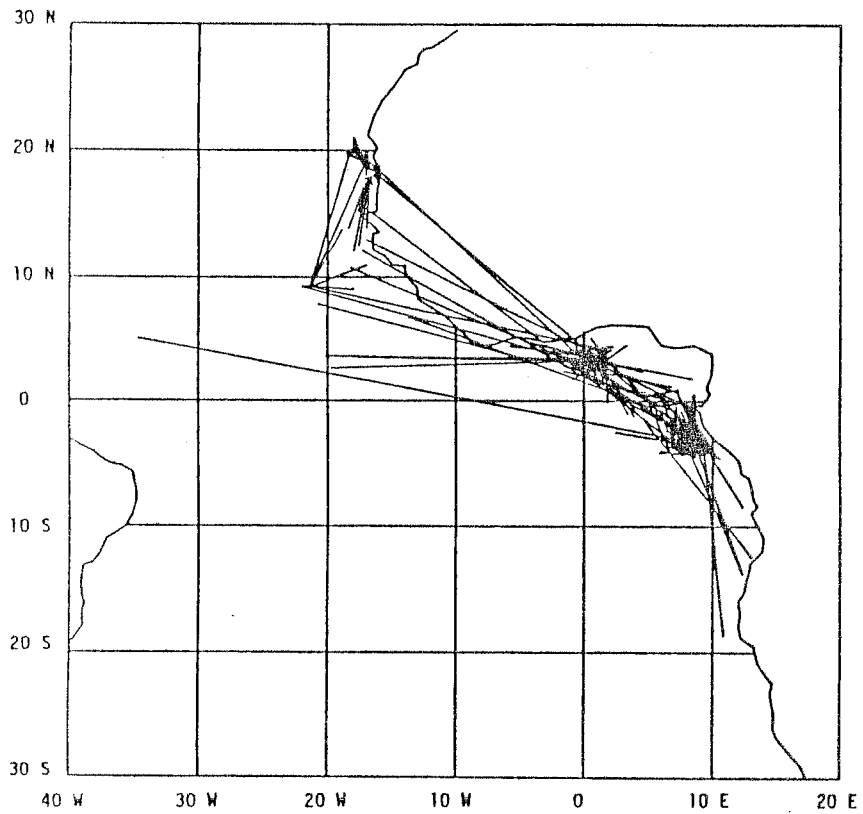


Fig. 3. Trajectories of the tagged bigeye tuna expressed in a straight line.
All available data are shown.

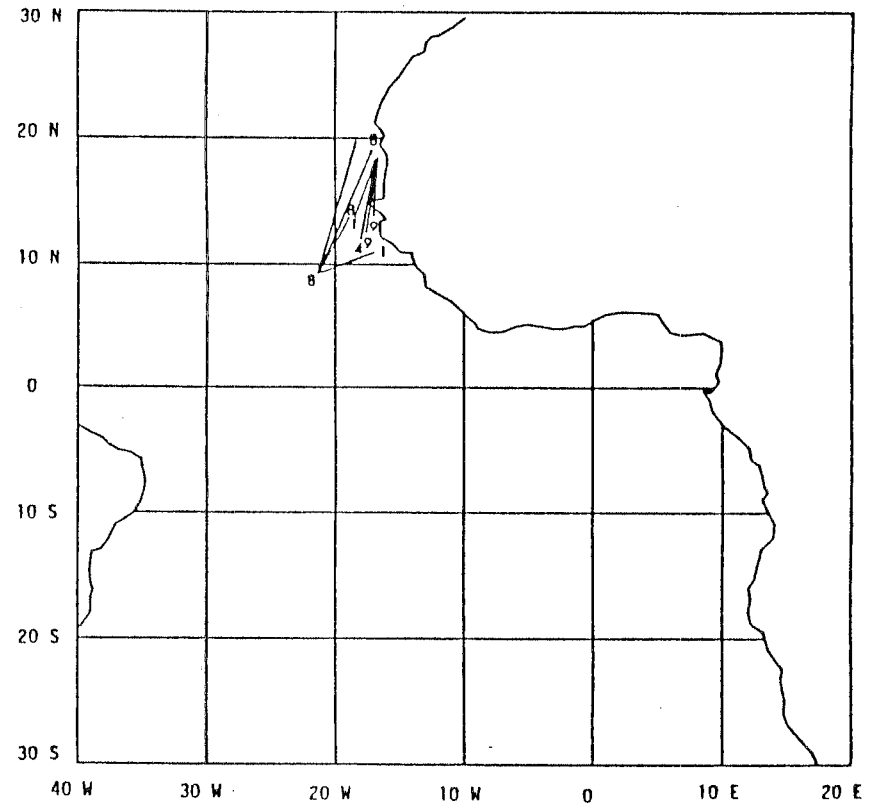


Fig. 4 (1). Trajectories of the tagged bigeye tuna expressed in a straight line.
Data are plotted for those released in the area off western Africa.

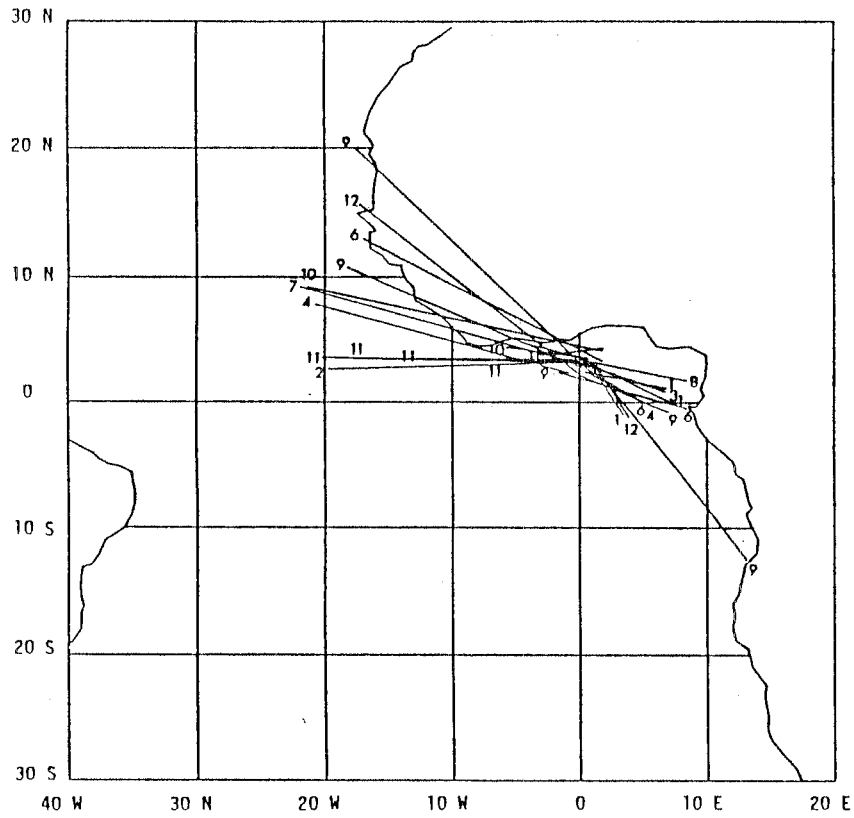


Fig. 4 (2). Trajectories of the tagged bigeye tuna expressed in a straight line. Data are plotted for those released in the central area of the Gulf of Guinea.

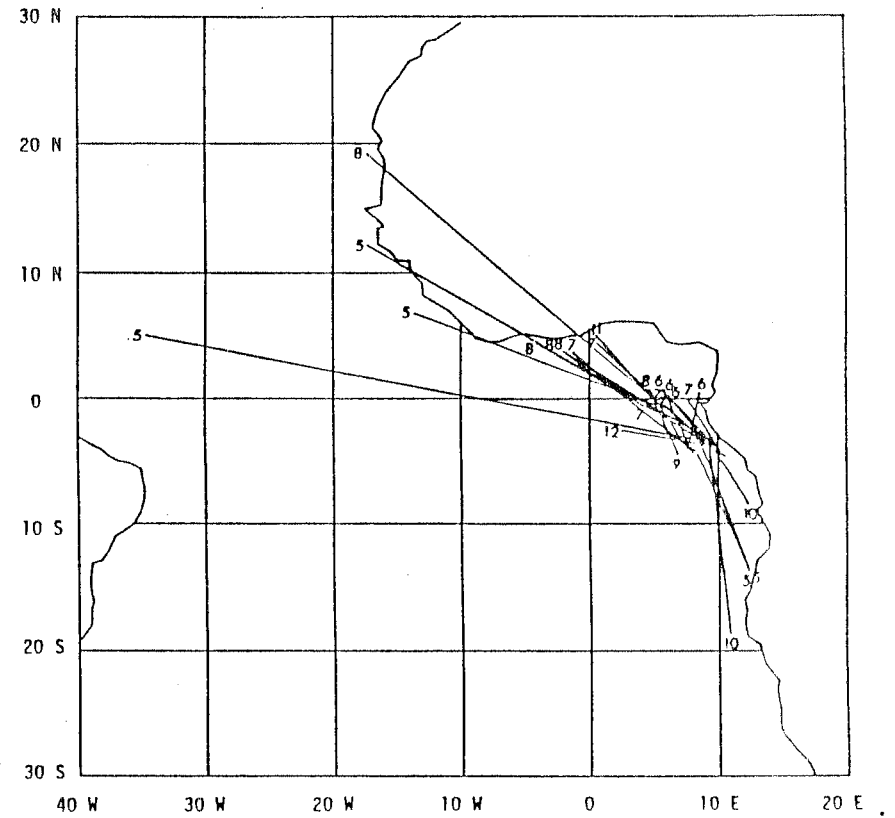


Fig. 4 (3). Trajectories of the tagged bigeye tuna expressed in a straight line. Data are plotted for those released in the eastern area of the Gulf of Guinea.