

NEW DATA ON REPRODUCTION OF AUXIS SPP. IN THE GULF OF GUINEA

G. P. Rudomiotkina

SUMMARY

The reproduction of *Auxis* spp. (frigate and bullet tunas) in different sites off the West African coast is usually confined to the warm season of the area. The spawning of frigate tuna is likely to occur from April to September off Sierra Leone, in summer in the Gulf of Guinea, November and December off Congo-Angola. The spawning of bullet tuna is observed in April-June in the Gulf of Guinea and from September-October to March off Congo-Angola. Spawning is recorded at the surface water temperature ranging between 21.6° and 30.5°C and the salinity of 33.2-36.0‰, and massive spawning is observed at temperatures over 25-26°C.

RESUME

La reproduction d'*Auxis* spp. ("frigate tuna" et "bullet tuna") dans divers secteurs au large de la côte ouest africaine a normalement lieu durant l'été. La ponte du "frigate tuna" se produit généralement d'avril à septembre au large du Sierra Leone, en été dans le golfe de Guinée et en novembre-décembre au large des côtes Congo-Angola, alors que celle du "bullet

tuna" a lieu en avril-juin dans le golfe de Guinée et de septembre-octobre à mars au large des côtes Congo-Angola. La ponte est observée à une température de surface oscillant entre 21,6° et 30,5°C, une salinité de 33,2-36‰, une ponte massive se produisant à une température supérieure à 25-26°C.

RESUMEN

La reproducción del *Auxis* spp. en diversas áreas frente al Africa occidental, se limita generalmente a la estación cálida. Es probable que el desove de la melva (*Auxis thazard*) tenga lugar desde abril a septiembre, frente a Sierra Leona, en el Golfo de Guinea en el verano, y en noviembre-diciembre frente a las costas de Congo y Angola. Se observa que el "bullet tuna" desova en abril-junio en el Golfo de Guinea, y de septiembre-octubre a marzo, frente a Congo - Angola. El *Auxis rochei* desova en abril-junio, en el Golfo de Guinea, y desde septiembre-octubre a marzo, frente a Congo-Angola. Se aprecia que el desove tiene lugar cuando la temperatura del agua oscila entre los 21.6°C y 30.5°C, y la salinidad del agua entre 33.2 - 36.0‰, y se observa que las actividades de desove alcanzan su punto máximo en temperaturas superiores a 25-26°C.

The reproduction ecology of tunas of genus Auxis is one of the least studied aspect. To improve the considerations about the areas and dates of spawning of these fishes the results of the long-term studies on the distribution of the small-sized larvae of frigate tuna Auxis thazard Lacepede and bullet tuna A.rochei Risso and information on reproduction of these species from the summary by V.N.Chur (1977) are considered in the present paper. Unfortunately, the literature data on occurrence of the larvae of Auxis spp. cannot be used since they were not separated into species. (Matsumoto, 1959; Kazanova, 1962; Richards, Simmons, 1971; Nishikawa, Kikawa, Honma, Yeyanagi, 1978).

Frigate tuna

In the Sierra Leone area the larvae were found in May-June (fig.1-II) at the temperature of 24.5-27.5°C and salinity of 34.5-35.3‰ and in October (fig.1-IV) at the temperature of 25.5-28.5°C and salinity of 30.2-32.4‰. High larvae catch (up to 5 sp./haul) was taken in May-June in the southern periphery of the powerful upwelling south-east of the Cabo Verde Islands - of the "Guinean Dome" (fig.1-II). No larvae were found during the other seasons of the year if the materials were collected. The absence of larvae in July-September may be attributed to the stable period of low salinity (less than 30-31‰); in the Conakry area this period is observed from July to November, and from October to November in the northernmost areas (Berrit, 1961, 1962). In January-March the absence of larvae is explained by the decrease in the surface water temperature (to 18-23°C) due to the penetration of the cold waters of the Canary Current to this area.

In the Gulf of Guinea the larvae were observed nearly all the year round, except in the coldest months of July-August (fig.1). Rather high catches of larvae (approximately 10 sp./haul) were taken in April-June in the Biafra Bay (fig.1-II), and in the Biafra Bay and off the Congo-Angola coast in October (fig.1-IV). The sites of higher concentrations of larvae are closely coincided with the zone of high biological productivity due to the river discharge. At the close of the hydrological fall rather stable conditions with the high surface water temperature (28-29°C) and high (in relation to the Biafra Bay) salinity (31-34‰) are

recorded in the Biafra Bay (Sigaev, 1976). West of the Biafra Bay (fig.1-II) the catches of larvae sharply diminish under the unfavourable conditions of the sharp change of the temperature from the warm season (27-29°C) to the cold season (24°C and below) although the appropriate values of salinity (34-35‰) are recorded.

The absence of the larvae in the sites off Congo-Angola can be explained by the increase in temperature (to 20-24°C) of the surface waters of the Benguela Current as well as by the significant freshening of the coastal waters (up to 30‰) due to the Congo River discharge (World Water balance and water resources of the Earth, 1974). Large larvae catches (approximately 100 sp./haul) were taken off the coastal upwelling zone between the Palmas Cape and Three-Points Cape in September and in the coastal waters of Congo-Angola in October-December (fig.1-III, IV). V.N.Chur (1977) reported on the massive spawning of frigate tuna in the latter area in September-November. The water temperature and salinity in the sites, where the larvae were caught, were 23.5-25.5°C and 33.7-35.0‰ for the first area and 24.5-26.0°C and 34.0-35.0‰ for the second area, respectively.

Bullet tuna

Judging by the occurrence of the pre-spawning fish in the Pointe Noire area, the spawning there is likely to occur in the beginning of the warm season, in November, and beyond doubt in later months (Chur, 1977). Within the area under study the larvae were found only in the different sites of the Gulf of Guinea (fig.2). In general, a similarity is observed between the distribution of larvae of bullet and frigate tunas, however there are some differences. High larvae catches (about 100 sp./haul) were reported from the periphery of the upwelling zone between the Palmas and Three Points Capes in June, a transition period between warm and cold seasons (fig.2-II). The second site of the high larvae catches (to 50 sp./haul) is located off Congo-Angola in a transition period as well, but between cold and warm seasons in September (fig.2-III).

It is worth of noting that the larvae of Auxis spp. were found at larger range of the surface water temperature (23.5-28.5°C) and salinity (30.2-35.3‰) in the sites of larvae catches

compared to the larvae of other tuna species (yellowfin, bigeye and skipjack tunas). However, the larvae were usually observed in numbers at the temperature exceeding 24-25°C, which correspond to thermal conditions of the warm season. Similar thermohaline conditions of occurrence of larvae of Auxis spp. were reported by the other researchers (Richards a.Simmons, 1971). In the Sierra Leone area they observed the larvae at the temperature from 21.6 to 30.5°C and salinity from 33.2 to 36.0‰.

So, the reproduction of Auxis spp. (frigate and bullet tunas) in different sites of the West African waters is usually confined to the warm season of its area. The spawning of frigate tuna is likely to take place from April to October off Sierra Leone, in summer in the Gulf of Guinea, in November and December off Congo-Angola. The spawning of bullet tuna is observed in April-June in the Gulf of Guinea and from September-October to March off Congo-Angola.

The spawning occurs against a background of large fluctuations of thermohaline conditions of surface waters: the temperature from 21.6 to 30.5°C and salinity of 33.2 to 36.0‰. Massive spawning is mainly recorded at the temperature over 25-26°C which corresponds to thermal conditions of the warm season.

References

1. Berrit G.R., 1961. Contribution a la connaissance des variations saisonnieres dans le golfo de Guinee. Observations de surface, le longo des lignes de navigation.-Cahiers Oceanogr., vol.13, N 10, pp.715-727.
2. Berrit G.R., 1962. Contribution a la connaissance des variations saisonnieres dans le golfe de Guinee.-Cahiers Oceanogr. vol.14, N 9, pp.633-643.
3. Chur V.N., 1977. Biology and fishing of skipjack, little tunny, frigate and bullet mackerels in the eastern Atlantic Ocean. Theses, INBYUM, Sevastopol, 24 p.
4. Kazanova I.I., 1962. Tuna larvae from the Tropical Atlantic Ocean. Vopr. ikhtiologii, v.2(3), vyp.24, p.451-461.
5. Matsumoto W.M., 1959. Description of Euthynnus and Auxis larvae from the Pacific and Atlantic Oceans and adjacent seas. Dana Report, N 50, pp.1-34.
6. Nishikawa Y., Kikawa S., Honma M. a.Yeyanagi S., 1978. Distribution atlas of larval tunas, billfishes and related species.- Results of larval surveys by R/V Shunyo Maru and Shoyo Maru (1956-1975). Far Seas Fisheries Research Shimizu 424, Japan, ser.9, pp.33-37.
7. Richards W.J. a.Simmons D.C., 1971. Distribution of tuna larvae (Pisces, Scombridae) in the North-western Gulf of Guinea and off Sierra Leone.-Fish.Bull.vol.69, N 3, pp.555-568.
8. Sigaev A.K., 1976. Results of observations on the currents in connection with the transformation of shelf waters of the Eastern Central Atlantic. In: "Oceanological research in the Atlantic Ocean", vyp.63, Kaliningrad, p.3-12.
9. World water balance and water resources of the Earth. 1974. Leningrad. Gidrometeoizdat, 638 p.

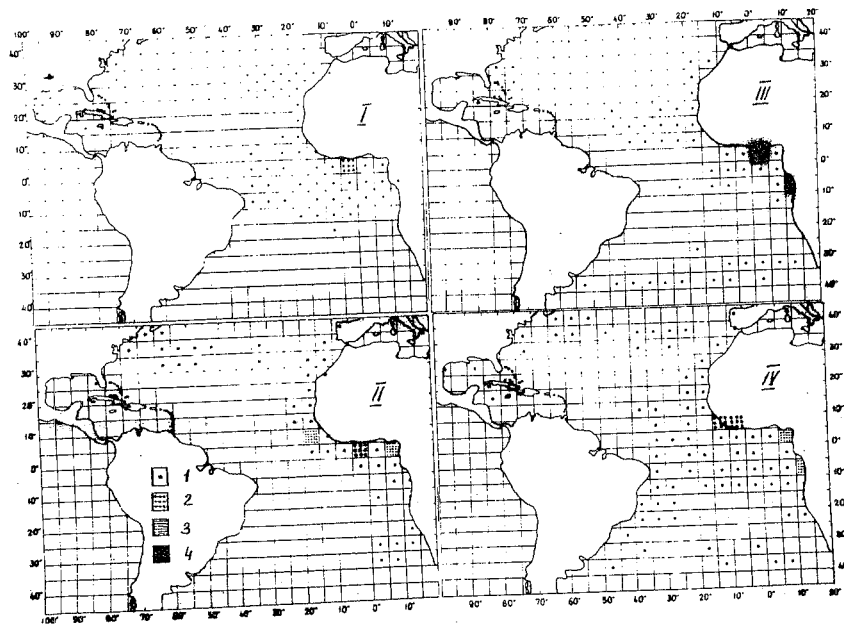


Fig.1 Distribution of larvae of frigate tuna in January-March (I), April-June (II), July-September (III), October-December (IV).

Definitions: 1--larvae absent
 2--0.1-1.0 larva
 3--1.1-5.0 larva
 4--more than 10.1 larvae per haul

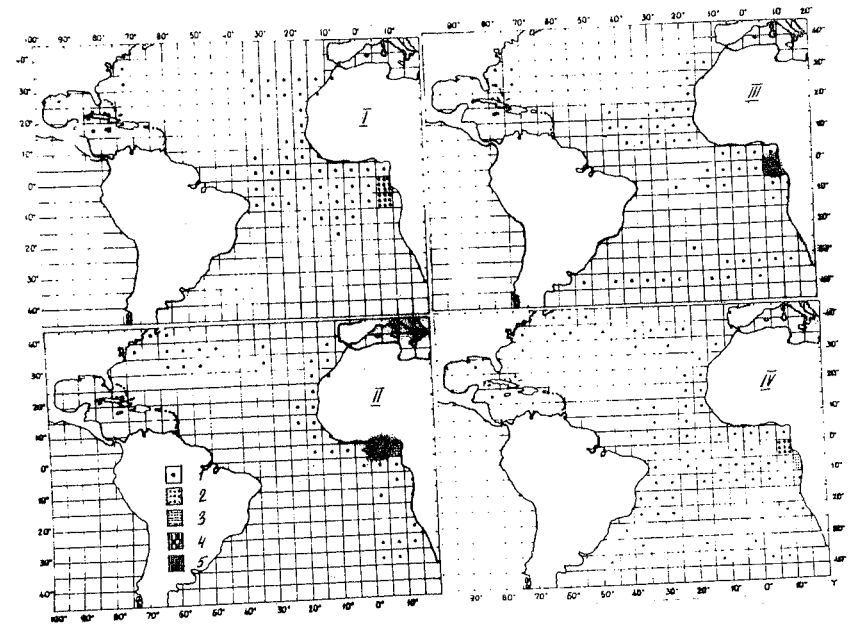


Fig.2 Distribution of larvae of bullet tuna.

Definitions: 1--larvae absent
 2--0.1-1.0 larva
 3--1.1-5.0 larva
 4--5.1-10.0 larva
 5--more than 10.1 larvae per haul.