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RELATIONSHIP BETWEEN FEEDING INTENSITY OF BIGEYE TUNA (THUNNUS OBESUS) OF THE GULF OF GUINEA AND THEIR CATCHES IN THE DAY TIME

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SUMMARY

The bigeye tuna longline catches are considered in this paper in relation to the time of day and total stomach filling index. The maximum catches were observed to be taken at 14-15 and 17-18 p.m. and corresponded to the mean values of the stomach filling index. The catches decreased with the increase of the mean index values.

RESUME

Ce document étudie les prises palangrières de thon obèse selon l'heure et l'indice global des contenus stomacaux. Les plus importantes prises ont été observées entre 14-15h et 17-18h et correspondaient aux valeurs moyennes de l'indice des contenus stomacaux. Ces prises diminuaient lorsque les valeurs moyennes de l'indice augmentaient.

RESUMEN

Las capturas de patudo por palangre, son examinadas en este informe con relación a la hora del día, así como al total del índice de contenido estomacal. Se observó que el máximo de capturas tiene lugar a las 14-15 y 17-18 p.m. y correspondió a los valores medios del índice de contenido estomacal. Las capturas disminuyeron con el aumento de los valores medios del índice.

Introduction

The selection of the optimum time of longline setting or, in other words, determination of the time of most intensive biting is the factor of great importance for successful fishing of bigeye tunas. Torin and Maximov (1969) studied a dependance of yielding living tunas on the time of the day in the area off Angola (10-15°S) and found that 13-14 and 16-17 p.m. (zonal time) are the periods of most intensive biting.

Later it was proved that the longline tuna catches depend not only on the biting intensity at different times of the day, but also on the food supply (Chur, 1973). The largest tuna catches were taken at the mean values of the filling index (1.5-2.3), and reduced catches were recorded when the filling indices deviated from the mean.

In this paper an attempt is made to establish the extent to which the period of intensive biting is related to the stomach filling index.

Material and Methods

The paper is based on the data obtained during the scientific-research cruises conducted in January-March 1972 and in January-April 1973 in Subarea 5 (according to ICCAT division).

The longline was used to yield bigeye tunas in the deepwater areas. In yielding living tunas the time of their lifting aboard was recorded. The complete biological analyses was made including weighing the food clot and determination of the food species composition. The total filling index ($\frac{P}{W}$) of the stomachs was calculated from the ratio of the food clot mass (g) to the total mass of a tuna (kg). The exact biting time is difficult to establish, therefore, in our calculations we considered the actual time of lifting tunas aboard assuming that in separate cases the error would not exceed 30 minutes on the average. For conversion to the filling grade which was determined visually by the four-grade scale the nomogram of conversion of the total filling index to the filling grade was calculated tentatively (fig. 1). The data on the stomach filling of tunas yielded in one or another period were summed by half hour's interval and the method of the arithmetical mean was used to estimate the mean stomach filling index. A total of 162 tuna specimens was examined.

Results

The relationship between the yield of living tunas and the index of their stomach filling within the interval of 13-20 hours is shown in fig. 2. It should be noted that the changes in the filling index and the yield of tunas are in a good correspondence and have two peaks. The maximums of the filling index curve are somewhat shifted to the left relative to the maximums of the tuna yield curve.

We suggest that at the beginning of biting (increased number of hooked tunas) the stomach filling index decreases to the value of $20 \cdot 10^{-4}$ (region A), i.e. tuna in search of food readily swallows easily accessible longline bait. In the next region B the filling indices and tuna catches increase in direct proportion and are the highest. The longline bait and living food objects are likely to be of similar importance for tunas. This suggestion

agrees with the data reported by Chur (1973), who noted that the largest bigeye tuna catches were taken at the mean stomach filling grade of 1.5-2.3 which corresponds to filling indices ranging between $20 \cdot 10^{-4}$ and $35 \cdot 10^{-4}$. If the filling index exceeds $35 \cdot 10^{-4}$, the catches begin to reduce, although the index continues to rise reaching the maximum value - over $50 \cdot 10^{-4}$ (region C). It seems that at a definite degree of satiation with food tunas lose interest for the longline bait which results in a sharp decline of the catches. Later this cycle is repeated.

As far as the periods of intensive biting are concerned, they may differ in various parts of the bigeye tuna feeding area which is confirmed by the data of Torin and Maximov (1969) and by our data.

Conclusions

The longline catches of bigeye tuna in the open Gulf of Guinea depend on both the food supply and the feeding mechanism. There occur definite periods when the bait becomes less attractive for tunas than the natural food objects.

The largest tuna catches are taken at the mean values of the total filling index (around $35 \cdot 10^{-4}$ or 2.3 according to the four-grade scale); the catches decline with further increase of the feeding intensity.

In the day-time two peaks of most intensive biting by bigeye tuna are observed, the latter falling on different time periods in various ocean parts.

References

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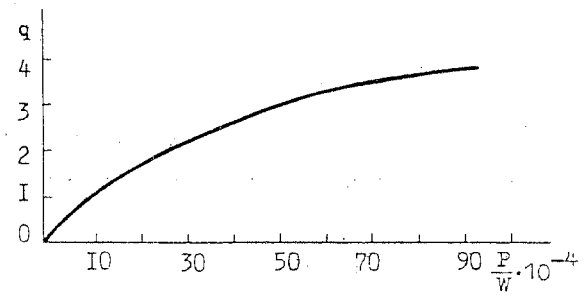

Fig. 1 Nomogram of the total stomach filling index conversion to the filling grade.

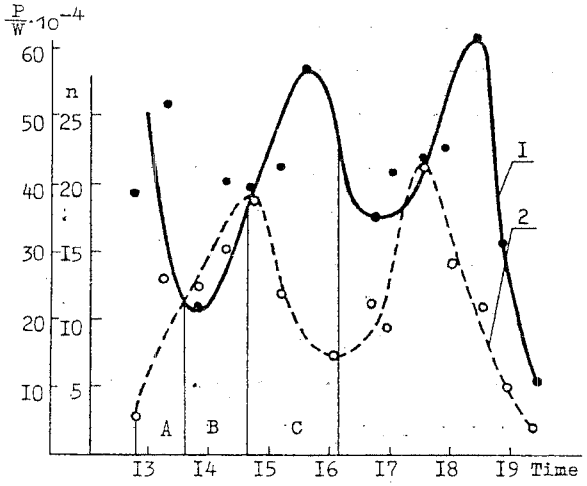

Fig. 2 Variation of the total yield of living tunas and of their total stomach filling index.