LENGTH-FREQUENCY ANALYSIS OF YELLOWFIN TUNA (*THUNNUS ALBACARES*) IN THE OMAN SEA

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ABSTRACT

Yellowfin tuna (Thunnus albacares) in the northern coastal waters of the Oman Sea was assessed using length data collected from the artisanal fisheries using surface gillnets. Sampling was carried out at 5 major landing sites during 1997-98. Data were analysed using the FISAT package. The growth parameters estimated were K=0.42, L_∞ =196 cm*, and to=-0.38. The total and natural mortality coefficients were estimated as Z = 0.8 and M = 0.57, respectively. The rate of exploitation was found to be 0.27.*

Introduction

Large pelagic fisheries form an important part of the marine production in Iran. They are traditionally caught by Iranian fishermen in the Oman Sea and the Persian Gulf. Most of the catches are made using drifting gillnets (Khorshidian *et al.*, 1994).

Yellowfin is the dominant tuna species in the large pelagic fisheries in Iran, and catches of yellowfin tuna are limited to the area of the Oman Sea, which shows a marked seasonality. Biological data have been collected on some important species in the Persian Gulf and the Oman Sea since 1986. In 1990, the Iranian Fisheries Research Organization initiated a programme for the assessment of five major tuna species. Length-frequencies and some other biological data are collected each year in the Oman Sea.

Materials and methods

The material for the present study, conducted jointly by the Oman Sea Fisheries Research Center and the Offshore Fisheries Research Center, was collected by field technicians of the Iranian Fisheries Research Organization. Data on fork length and body weight were collected for a sample of yellowfin tunas at the landing sites along the Oman Sea (Bandar Abbas, Jask, Pozm, Ramin, and Beriss) in 1997-98. Samples of yellowfin tuna caught by surface gillnet and all types of craft were measured to the nearest centimeter and nearest 100 grams. The monthly length-frequency data were then analysed using the FiSAT package (Gayanilo *et al.*, 1997). The growth parameters K and L_∞ and the value of t_o were estimated using Shepherd's method and the von Bertalanffy equation, respectively. Total mortality (Z) was estimated by a Powell-Wetherall plot, which uses growth parameters and length-frequency data. Natural mortality (M) was estimated by using the growth parameters and the mean environmental temperature (Pauly's formula). Fishing mortality (F) was then estimated from Z. The exploitation rate (E) was estimated by using the formula $E = F/Z$. The recruitment pattern of yellowfin tuna was obtained by using the length-frequency data, K, and L_∞.

Results

Length-frequency distribution

The length frequency distribution of yellowfin is given in Figure 1. One specimen with a length of 174 cm appeared in the catch, and the mean size of yellowfin tuna obtained in the year was 82.8 cm.

Growth

Shepherd's method was used for estimating growth. The 12-month sample gave the values of L_∞ as 196 cm, and annual K as 0.42. The value of t_o has been estimated as -0.38 (Figure 2)

Mortality

From the length-frequency distribution, the total mortality (Z) was estimated as 0.8, using the Powell - Wetherall plot method with estimated values for L_∞ and K (Figure 3). Natural mortality (M) was estimated independently as M=0.57 using the method given by Pauly,

$$\log M = - 0.0066 - 0.279 \log 10 L_\infty 0.6543 \log 10 K + 0.4634 \log 10 t,$$

where the average sea water temperature in the Oman Sea was estimated as 25.5°C . The exploitation rate was estimated as 0.27.

Recruitment patterns

The recruitment pattern based on the growth parameters (K, L_∞) is shown in Figure 4.

Discussion

The biological studies made during the last years contributed only to our knowledge of yellowfin tuna taken by gillnet gear in the Oman Sea and some other areas in the Indian Ocean. There is however a need to strengthen the studies from research vessels as well as from commercial catches (Sudarsan *et al*., 1994).

The length-frequency analysis of 1997-98 shows that from December on the proportion of younger fish is higher than that of older fish, and there is a sudden drop in the average length of the fish in the December-March period. This result is the same as in Firoozi and Carrara (1994). Figure 1 indicates that only younger yellowfin tuna are available in the fishing grounds; few older ones can be found.

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References

Firoozi, A., and G. Carrara. 1994. An analysis of length-frequencies of *Thunnus albacares* in Iranian waters. Proceedings of the Expert Consultation on Indian Ocean Tunas, 5th Session, Mahé, Seychelles, 4-8 October, 1993: 95-102.

Gayanilo, F.C., Jr., P. Sparre and D. Pauly. 1997. The FAO-ICLARM Stock Assessment Tools (FISAT) user's guide. FAO computerized information series (Fisheries). No 8. Rome, FAO. 126 .

Khorshidian, K., and G. Carrara. 1994. An analysis of length-frequencies of *Thunnus tonggol* in Hormuzgan waters, Islamic Republic of Iran. Expert Consultation on Indian Ocean Tunas, 5th Session, Mahe, Seychelles, 4-8 October, 1993: 67-72.

Sudarsan. D., and M.E. John.1994. Further studies on biological aspects of yellowfin tuna in the Indian EEZ. Proceedings of the Expert Consultation on Indian Ocean Tunas, 5th Session, Mahe, Seychelles, 4-8 October, 1993: 135-141

Figure 1. Length-frequency distribution of yellowfin tuna in the Oman Sea, 1997-98.

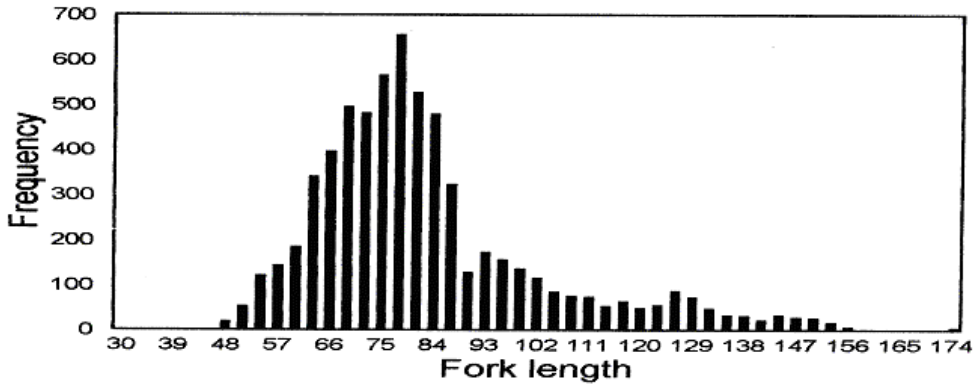

Figure 2. Growth estimation by Shepherd's method.

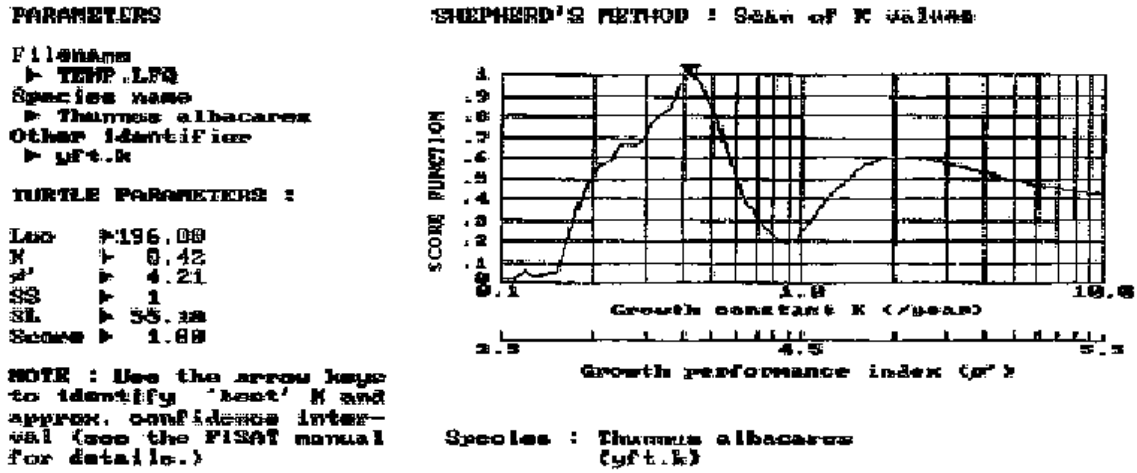

Figure 3. Estimates of total mortality by Powell-Wetherall plot

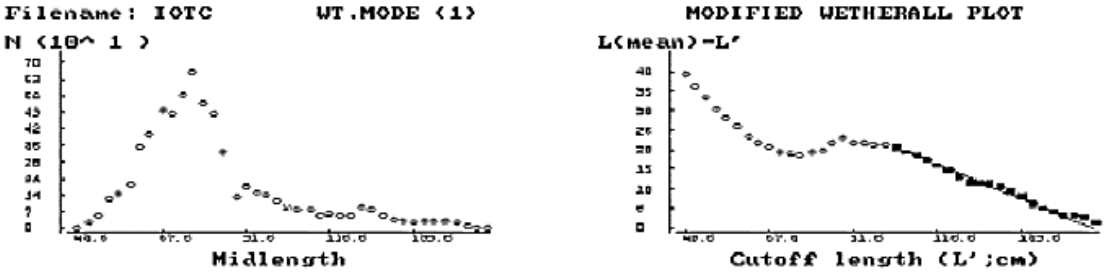

Figure 4. Recruitment pattern of yellowfin tuna in the Oman Sea