

POPULATION PARAMETERS AND FEEDING HABITS OF YELLOWFIN TUNA (*THUNNUS ALBACARES*) IN THE OMAN SEA

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ABSTRACT

*The yellowfin tuna (*Thunnus olbacares*) was caught more than any other species in the southern waters of Iran (more than 24000 tons). The length frequency analysis was carried out at 5 major landing sites in the Oman Sea from 1998 to 1999.*

Data were analyzed using the FISAT software. The growth parameters were estimated as $K=0.42$, $L_8=189$ and $t=-0.23$. The total and natural mortality coefficient were respectively estimated as $Z=1.85$ and $M=0.6$. The exploitation rate was found 0.68.

INTRODUCTION

Yellowfin tuna (*Thunnus albacares*) constitutes around 17% of the total landings in the Persian Gulf and the Oman Sea (more than 24000 tons). The major type of fishing gear is gillnet, while other commercial fishing gears like purse seine and long line are considered minor in relation to the percentage of tuna catches. The traditional gillnet fishery for yellowfin tuna has undergone a major change with mechanisation of their craft in the 80's. There was an increase in effort and improvement in the tuna landings from about 20000 tons in 1991 to more than 71000 tons in 1999.

MATERIALS AND METHODS

Sampling was confined to public landing sites and fish processing companies from April 1998 to September 1999. Fork length and total weight of yellowfin tuna were respectively measured to the nearest Cm and 100g below from east to west of the Oman Sea including Berris, Rainin, Chahbahar, Pozm and Jask.

The monthly length frequency data were then analysed using FISAT package (Gayanilo et al., 1996). The growth

parameters K , L_8 and t were estimated by Shepherd's method according to the Von Bertalanffy equation. Total mortality (Z) was estimated by Powell - Wetherall plot which makes use of growth parameters and length frequency data.

The natural mortality (M) was estimated by using the growth parameters and the mean environmental temperature (Pauly's formula). The fishing mortality (F) was then estimated from $F=Z-N$. The exploitation rate (E) was estimated by using the formula ($E=F/Z$).

RESULTS

Length-weight relationship:

Length-weight relationship (Fig.1) was calculated from 312 observations in the Oman Sea. The relationship obtained is as follows:

$$W=0.000012L^{3.083}$$

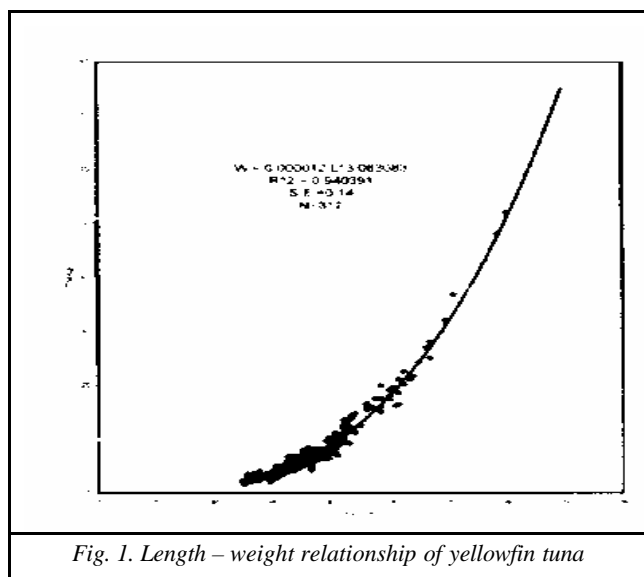


Fig. 1. Length – weight relationship of yellowfin tuna

Growth

The following set of growth parameters gave the best fit to the length - frequency data.

$$\{L8 = 189, K = 0.42, t. 0.23\}$$

The growth curve fitted with these parameters to the length data is shown in Fig.2

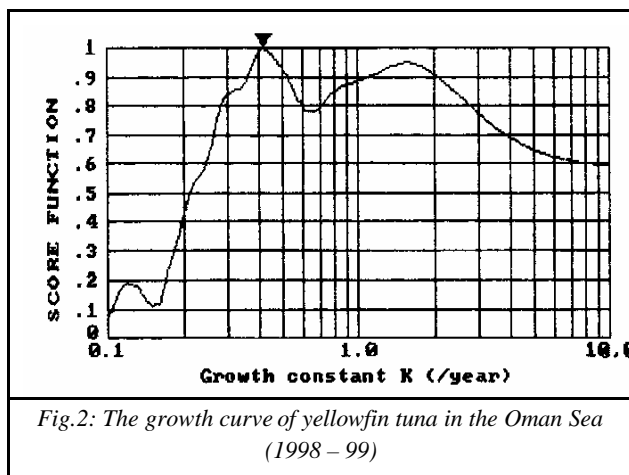


Fig.2: The growth curve of yellowfin tuna in the Oman Sea (1998 – 99)

The estimated total mortality by the length convened catch curve (Fig.3) for the above set of growth parameters was 1.85 per year. The estimated natural mortality was 0.6 considering the mean sea surface temperature ($T=27.5^{\circ}\text{C}$) and the fishing mortality was 1.25 per year. The exploitation rate was estimated 0.68.

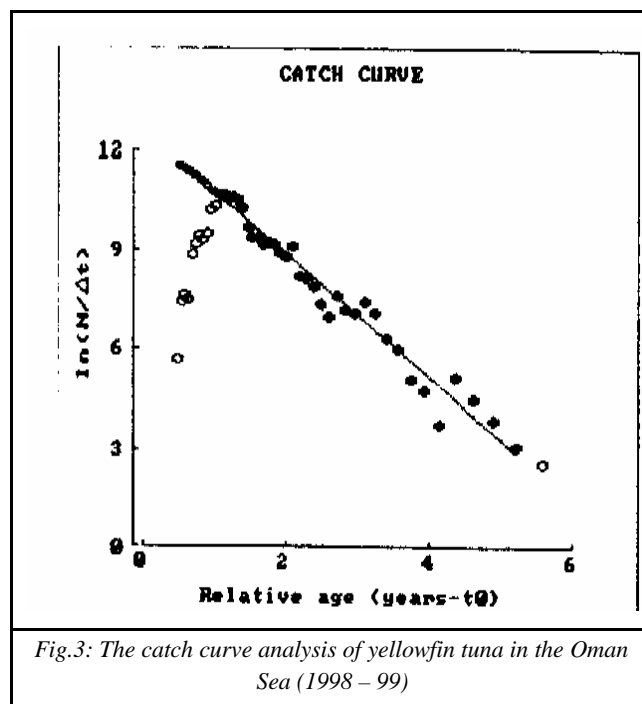


Fig.3: The catch curve analysis of yellowfin tuna in the Oman Sea (1998 – 99)

Feeding habits:

546 observations were made during 1998-99. Occurrence of empty stomachs was 59.37% in females and 63.1% in males. Purpleback flying squid (*Sihoteuthis oualaniensis*) was the most dominant prey species observed in specimens (60% in males and 57% in females) (Fig.4). Occurrence of teleost fishes was found to be the second (38% in males and 42% in females) and crabs (2% in males and 1% in females).

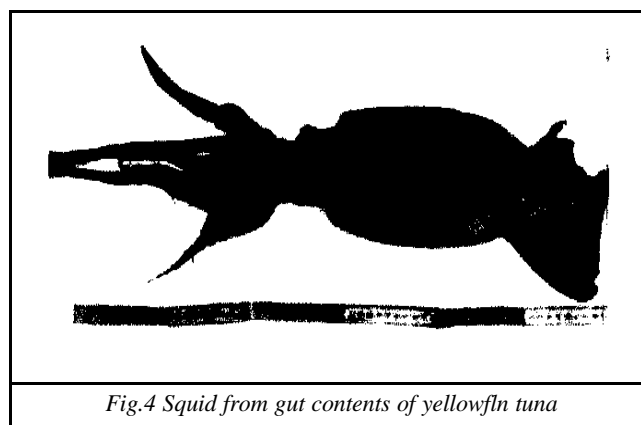


Fig.4 Squid from gut contents of yellowfin tuna

DISCUSSION:

Length – weight relationship:

The analysis of t-test indicated that the difference of $b(3.083)$ of this study in comparison with 3 is not statistically significant, therefore it can be concluded that the growth of yellowfin tuna is isometric.

Some of the length- weight relationships in the Indian seas are given below:

| Source | fishing method | sample size | length – weight |
|---------------------------------|----------------|-------------|-----------------|
| John, 1995 LA2.8423 | Longline | 422 | W=0.000038062 |
| Pillai et al., 1993 LA2.7433 | Pole&line | 628 | W=0.00003852 |
| | Gill net | | |

Feeding habits:

Occurrence of empty stomachs was high (59.37% in females and 63.1% in males) in the specimens obtained from the Oman Sea compared to those from east coast of the Indian waters (30.3%), west coast of Indian waters (12.5%) (Sudarsan & John, 1993).

High percentage of empty stomachs in this study is due firstly to the long duration of the operational time of commercial fishing in the Oman Sea after sunset.

Based on studies conducted in the Atlantic Ocean, Grudin (1989) reported that *T.albacares* starts feedings around 07:00 am, the feeding intensity gradually increases as the day progresses, reaches a maximum around 03:00 pm and ceases at 09:00 pm (Grudin, 1989). According to the studies of Roger (1993), tunas are day-feeders. Gut contents of this study showed that squids are the most dominant prey species followed by teleost fishes and crabs. All studies of the Indian waters indicated also that squids are the most dominant prey species accounting for 37.0-61.2% of food items followed by teleost fishes and crabs (*Charybdis sp.* (John, 1998).

According to the results of this study, only one teleost fish of Monacanthidae family was identified, but in the other studies, some teleost fishes were identified in gut contents including: *Leiognathus sp.*, *Priacanthus sp.*, *Caranx sp.*, *Auxis sp.*, flying fish, skipjack tuna etc.

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