RESTRICTED

INTERNATIONAL COMMISSION FOR THE NORTHWEST ATLANTIC FISHERIES

Serial No. 1641
(D. c. 2)

ICNAF Res. Doc. 66-42

ANNUAL MEETING - JUNE 1966

The rate of growth of Butterfish (Poronotus triacanthus (Peck)) and Ocean Pout (Macrozarces americanus (Schneider)) from the region of Georges Bank

by B. Draganik and Cz. Zukowski

Material for the present paper was collected aboard M/T Wieczno during its research cruise between 6 August and 2 October 1965.

Ocean pout was scarce during fishing on Georges Bank, while butterfish occurred in abundance in concentrations over the western and southwestern slopes of Georges Bank, ensuring catch per effort up to 400 kg per one hour trawling.

The age of investigated fish was read from the otoliths. Age composition of the exploited population of butterfish was determined and showed that fish 3, 4 and 5 years old predominated in the catches (total 73.4%). For ocean pout only the rate of growth was established.

It should be stressed here that the narrow span of age of both of the investigated species, the large fluctuations in the rate of growth and possibly the effect of gear selectivity on the mean length of juvenile fish were the determining factors for the choice of the back-calculation method for determination of growth rate. In view of the lack of materials for determining the relation between fish length and the length of its otolith ray, the rate of growth was calculated on the basis of the assumption that there exists a direct relation between fish length increase and the length increase of its otolith ray. The only justification for this assumption could be found in the comparison between fish length computed from back-readings and by the method of direct readings. These differences were found to be very slight for ocean pout (Fig. 1), thus proving the assumption to be correct. The comparison of length increase in consecutive years of fish life showed that their rate of growth was dropping, which gave the basis for establishing the rate of growth for ocean pout according to the Bertalanffy formula (Beverton and Holt, 1957):

$$L_t = L_\infty [\, 1 - e^{-k(t-to)} \,]$$

where L_t - fish length at age t
L_∞ - asymptote of curve of growth in length
to - arbitrary origin of growth curve
k - coefficient constant

The calculated parameters are: $L_\infty = 61.5$ cm; $k = 0.365$; $t_o = -0.27$. Figure 1 shows the curve plotted according to these data and is in accordance with the empirical data.

The growth rate of butterfish, determined on the basis of back and direct readings, decreases as the fish get older. Mean length values for particular groups of growth, obtained from direct measurements, are considerably higher to analogical data obtained from back-readings. The question arises whether the rate of growth in the first years of fish life is really as fast as it appears from direct readings. This phenomenon might have been influenced by, among other things, the following factors: the period of taking samples, gear selectivity, recruitment and disproportional growth in length of otolith and fish. In view of the scarcity of material, the investigation of these factors was not possible.

It should be mentioned here that the data obtained from back-readings for growth rate is more similar to those cited by Bigelow and Schroeder (1953). For this reason it seems more reliable to accept the rate of growth from back-readings.

On the basis of the above data, the parameters of the Bertalanffy equation were computed. They are respectively: $L_\infty = 20.5$ cm; $k = 0.468$; $t_o = -0.65$. The curve characterizing the rate of growth was plotted and is given in Fig. 2.

The differences in the rate of growth for butterfish, indicated above, show the need for additional material and investigations. Such investigations should lead to establishing the relation between fish length and the length of its otolith ray. In addition, the effect of gear selectivity on the collected materials should be determined.

Also the coefficients of the equation characterizing the relationship between the length of butterfish and its weight, were calculated from the formula:

$W = Kl^n$ (Beverton and Holt)

where W - weight of fish in grams

l - length in centimeters

K and n - coefficients constant.

They are respectively: $K = 0.0170$; $n = 2.94$. Graphic representation of the curve characterizing this relation is given in Fig. 3.

References

Beverton, R. and S. J. Holt. 1957. On the Dynamics of Exploited Fish Populations. London.

Bigelow, H. and W. Schroeder. 1953. Fishes of the Gulf of Maine. Fishery Bull. of Fish and Wildlife Service V. 53.

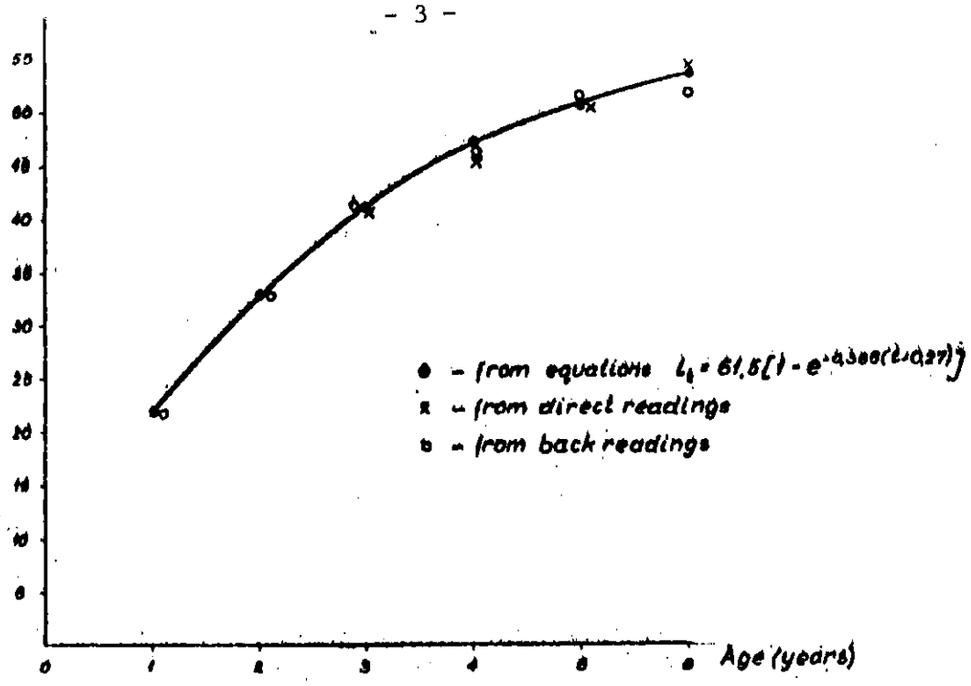

FIG. 1. Rate of growth of Ocean Pout.

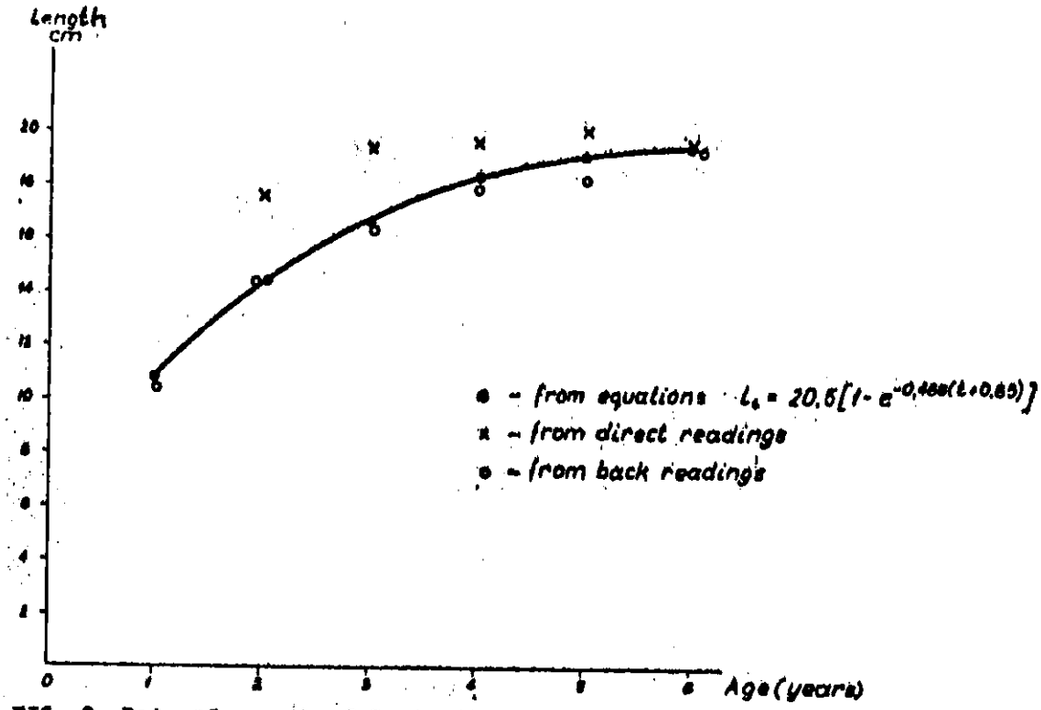

FIG. 2. Rate of growth of Butterfish.

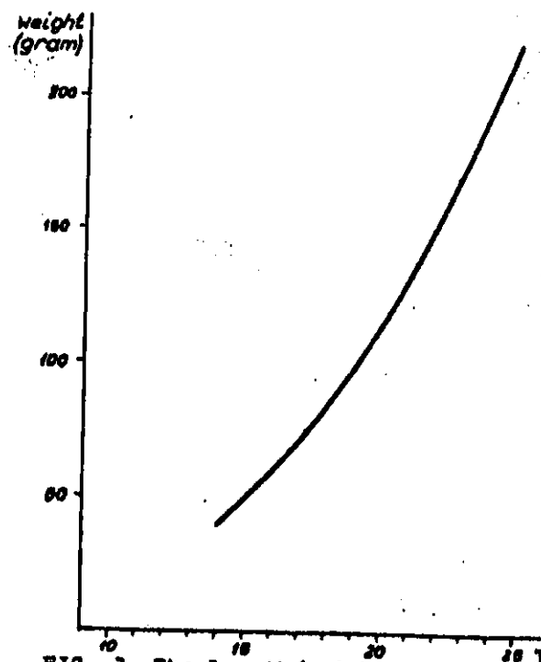

FIG. 3. The length/weight relationships in Butterfish.