AGE ESTIMATION AND CATCH COMPOSITION OF BLUEFIN TUNA IN THE EASTERN MEDITERRANEAN

E. Zarkadi and P. Megalofonou*

School of Post Graduate Studies in Oceanography, Department of Biology, Section of Zoology-Marine Biology, University of Athens, Greece - ezarkadi@yahoo.com, yannmega@biol.uoa.gr

Abstract

Bluefin tuna, *Thunnus thynnus*, caught by the Greek fleet in the Eastern Mediterranean was sampled from November 1998 to July 1999. Age was estimated using anal fin spines. Mean lengths at age were calculated. The specimens ranged from 99 to 264 cm in length and their ages were between two and eleven years.

Keywords : Eastern Mediterranean, Growth, Pelagic, Teleostei, Thunnus thynnus.

Introduction

Bluefin tuna, *Thunnus thynnus*, is a pelagic species with a high commercial value, characterized by intensive migration and wide geographical distribution. There have been few studies estimating age and growth of the Mediterranean bluefin tuna. The objectives of this work were to estimate the age of bluefin tuna using anal fin spines and to evaluate the size and age structure of the stocks exploited by the Greek fleet.

Materials and Methods

Anal fins and fork length (FL) measurements were collected from 285 bluefin tuna caught in the Aegean and Ionian Sea, from November 1998 to July 1999. Since many sampled fish were eviscerated and without heads, from each individual the pectoral fork length (PF) was measured too. The relationship between fork length and pectoral fork length was evaluated and pectoral fork lengths were converted to fork lengths.

Three sections near the spine base (0,7 to 1 mm thick) were taken from the first four anal spines using a slow speed saw. Growth bands were counted to estimate the age of fish [1].

Results

The fork length of 285 specimens ranged from 99 to 264 cm with a mean value of 150,5 cm. The most frequent length classes were between 130 and 160 cm (figure 1). A significant linear relationship was found between fork length and pectoral fork length (FL=1,369PF; P<0,05).

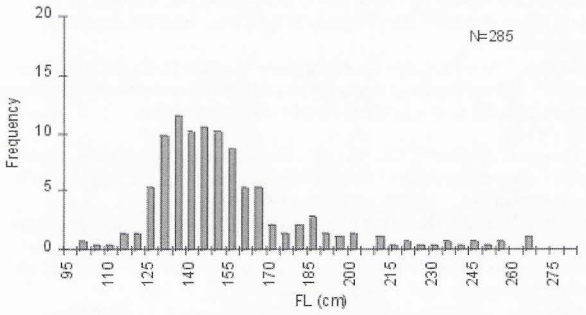

Figure 1. Length frequency distribution of bluefin tuna caught by hand line in the Eastern Mediterranean in 1998-99.

Based on the counts of the translucent zones we estimated ages between 2+ years and 11+ years. Vascularization of the bony tissue was observed in the centre of the spines. The mean lengths per age group are illustrated in figure 2.

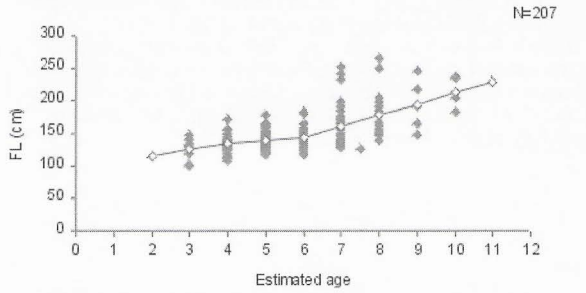

Figure 2. Mean fork lengths at estimated ages for bluefin tuna caught by hand line in the Eastern Mediterranean Sea in 1998-99.

Age group 5 was found to be the most recurrent, with a percentage of 30.92%, following by the age groups 4, 6 and 7 with percentages of 13%, 21.26% and 15.46%, respectively. Juveniles were completely absent.

Discussion

A wide variety of aging techniques have been applied to bluefin tuna, including examination of hard parts such as scales, otoliths, vertebrae and spines [1]. Dorsal spines have been frequently used in age and growth studies of bluefin tuna [2,3,4], whereas anal spines have been used mainly for other large pelagic species.

The use of anal fin spines to estimate age had the advantage of easy sampling and the growth bands stood out clearly. The disadvantage of this method was the vascularization of bony tissue in the centre of the spine, which could lead to an underestimation of the age because of the loss of early bands. This problem, which increased with the size of the specimens, could be avoided by calculating the positions of the first bands in the spines of juveniles and considering them at the age estimations.

Age estimations of the present study appear to be realistic enough and seem consistent with what is known about the growth of the species [1, 2].

These results, even though preliminary, revealed that hand line catches in the Mediterranean Sea were made up mainly by adult bluefin tuna. In fact, the youngest specimen in our sample was 99 cm in FL and the tentative to collect smaller specimens gave no results, because those catches were very rare.

To improve age and growth knowledge on Mediterranean bluefin tuna, further investigation is required, using different techniques and a wider number of length classes, including juvenile specimens.

References

1. Foreman T. J. 1996. Estimates of age and growth and an assessment of aging techniques, for Northern bluefin tuna, *Thunnus thynnus*, in the Pacific Ocean. *Bull. I-ATTC*, 21(2) : 75-123.

2. Compeán-Jimenez G., and Bard F. X., 1983. Growth increments on dorsal spines of eastern Atlantic bluefin tuna, *Thunnus thynnus*, and their possible relation to the migration patterns. *U. S. Dep. Commer., NOAA Tech. Rep. NMFS* 8 : 117-122

3. Megalofonou P. & Demetrio G., 2000. Age estimation and annulus formation in dorsal spines of juvenile bluefin tuna, *Thunnus thynnus*, from the Mediterranean Sea. *J. Mar. Biol. Ass. U.K.* 80, 753-754.

4. Cort J.L., 1991. Age and growth of the bluefin tuna, *Thunnus thynnus* (L.) of the northest Atlantic. *ICCAT, Col. Vol. Sci. Pap.*, 35 : 213-230.