FECUNDITY OF RED MULLET (*MULLUS BARBATUS* L., 1758) ALONG THE TURKISH COASTS OF THE MEDITERRANEAN SEA

Eyup Mumtaz Tirasin *, Aydin Unluoglu and Bulent Cihangir
Dokuz Eylul University, Institute of Marine Sciences and TechnologyIzmir-Turkiye - mumtaz.tirasin@deu.edu.tr

Abstract
A total of 194 red mullets, *Mullus barbatus,* were sampled for fecundity studies by bottom-trawl along the Turkish coasts of the North Aegean Sea during Summer 1991 and Spring 1992 and of the Northern Levant Sea in Spring 1992. The mean batch fecundity was 7023 eggs in summer and 7960 eggs in spring for the North Aegean Sea. The mean fecundity estimates were higher in the Northern Levant Sea, being 11180 and 13000 eggs for the western and eastern regions, respectively.
Keywords : Aegean Sea, Eastern Mediterranean, Levantine Basin, Reproduction.

Introduction
Red mullet (*Mullus barbatus*, Linnaeus 1758) (Pisces Mullidae) is one of the most valuable demersal fish species in the Mediterranean trawl fishery. Therefore, its biology and population dynamics have been widely studied in several regions of the Mediterranean Sea. However, previous investigations concerning the reproduction characteristics of the red mullet are limited, and only one study [1] provides information about its fecundity in Turkish coasts.

The main objective of this study is to present data on the fecundity of red mullet in the Mediterranean Turkish waters (North Aegean and Northern Levantine Seas).

Material and Methods
A total of 194 red mullet specimens with matured ovaries were used for fecundity estimation in this study. These fish were selected from the random subsamples of red mullets caught during the bottom trawl surveys conducted with R/V *K. Piri Reis* along the Turkish coasts of the North Aegean Sea in Summer 1991 and Spring 1992, and the Northern Levantine Sea in Spring 1992.

The fork length (mm) and total body weight (g) of each fish were measured on board, and gonad weight (g) and fecundity estimations were done in the laboratory.

Batch fecundity was determined using the hydrated oocyte method [2]. The relationship between batch fecundity and fish fork length (mm) was based on the function of $Y=a10^{bX}$, where the dependent variable (Y) is the batch fecundity and the predictor (X) is the fork length. This function was transformed to a linear form by taking logarithms, i.e. $\log_{10}(Y)= \log_{10}a+bX$. The linear regression analysis was used to fit this relationship to the data [3]. ANCOVA was also carried out to detect possible spatial differences in the values of the slopes b. Batch fecundity was divided by the ovary free weight of female fish in order to estimate relative fecundity (eggs/g). ANOVA was used to check if mean relative fecundity values differed spatially [3].

Results and Discussion
The fork length of the specimens caught ranged from 94 to 220 mm and the mean fecundity calculated was 7030 eggs in the North Aegean Sea during summer. A higher mean fecundity (7960 eggs) was found for the same region in spring. The mean fecundity estimates were 11180 and 13000 eggs for North-western and North-eastern Levantine Sea, respectively. The results of the regression analyses are given in Table 1. These analyses showed that batch fecundity increased with fork length. Larger red mullets have a significantly higher annual fecundity (per unit body weight) than younger ones. The slopes of the regression lines (all b values) were homogenous (according to the ANCOVA results). ANOVA and Tukey's HSD test showed that mean batch fecundity was significantly higher in the North-eastern Levantine Sea than in other areas. According to the results of ANOVA and Tukey's HSD test, there was a significant ($P<0.05$) difference in mean relative fecundities in the North Aegean Sea in Summer 1991 and Spring 1992 (Table 1). The mean relative fecundity was also significantly ($P<0.05$) higher in the North Aegean Sea in Spring 1992 than those estimated for the Northern Levant Sea (Table 1).

Tab. 1. Results of regression analyses by sampling area in Summer 1991 and Spring 1992. Here, n, min and max denote numbers of fish used in the analyses, and minimum, and maximum fork lengths, respectively. Estimated mean batch fecundities (BF) and their standard deviations (SD), and mean relative fecundities (RF) and their standard deviations (SD) are also given.

Season	Area	n	Fork Length			Coefficients			BF	SD	RF	SD
			min	mean	max	a	b	r^2				
Summer 1991	North Aegean	60	115	159	205	173	0.010	0.50	7030	4564	128	45
Spring 1992	North Aegean	42	101	137	173	287	0.010	0.60	7960	4038	216	75
	North-Western Levant	20	115	152	212	112	0.012	0.73	11180	7576	156	57
	North-Eastern Levant	72	94	160	220	391	0.009	0.36	13000	7293	173	64

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