POPULATION STRUCTURE OF PEARL MULLET

Structure of fish population usually varies with ecological characteristics of the environment they live in and also with genetic constitution of the species. By the term “population structure”, we mean data on size frequency distribution of a fish population, weight distribution, sex and age compositions, and length-weight relationship as explained below:

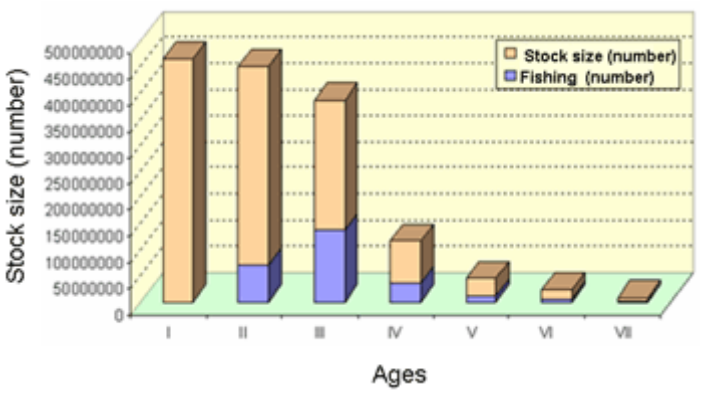
Sex Composition: Sex composition of a balanced fish population is generally 1:1. In other words, the ratio of male and female members within total fish population is equal to each other. If the size of fish population is lower than the carrying capacity of their habitat, the female ratio of sex composition is higher than the male ratio; if it is greater than the carrying capacity then the male ratio of sex composition is higher than the female ratio. This is called as the “Cybernetic Population Model” which in fact shows us that living organisms have their own dynamic balance as long as there is no human interference.

The male to female ratio of pearl mullet population except for the reproduction period is around 1:1.85. In other words, 36% of the total fish population is male whereas 64% is female. During the reproduction period, sex composition changes in favor of the male members. When sample fish groups are taken from rivers as their primary habitats for reproduction and analyzed further, it is seen that 64% of the total fish population is male whereas 36% of it is female at spawning. These ratios turn just the opposite of one another during and beyond the reproduction season. Since the pear mullet is not hermaphrodite in nature, where does such a difference originate? Sampling errors are those first come to mind. But various studies have repeatedly provided similar results. In this case, we cannot talk about any sampling errors. In

fact, the result of studies on spawning grounds of the pearl mullet is also valid for a majority of migratory fish species. Male members move to spawning grounds earlier and leave them later than female members. So, studies on spawning areas indicate that the male population is more intensive in such places (Sarı, 1997). The end results of studies on migratory fish species are also supportive of this argument on the pearl mullet population within which the sex ratio changes in favor of male members, and in some cases it can even be observed as 36:1 (Nikolskii 1980; Hofragle and Timmons 1989).

Age composition: Age composition of fish populations varies with reproduction, growth and mortality rates. As for the maximum life span, it is more related with the genetic constitution of fish.

There were various interpretations of maximum life span until 1997 depending on techniques used or fish tissue samplings taken for age determination of the pearl mullet population. But according to a recent study carried out by Sarı (1997), it is ideally best to use otolith for age determination. It is further emphasized that using scales or operculums does not provide accurate results for age determination in most cases due to the migratory nature of fish. After this study, the maximum life span of pearl mullet has been determined as a total of 7 years. Based on age distribution of pearl mullet yield, the actual age distribution was structured virtually using the virtual population analysis technique. Results can be seen as in the following diagram (Sarı, 2001).



Length and weight distribution: Length and weight distribution vary with genetic constitution of the species, ecological characteristics of the habitat, and population density available. In nutritiously rich environments, if the size of population is lower than the carrying capacity of it then fish can grow faster, and therefore, their length and weight composition will be higher than that of those in nutritiously poor environments. Any changes in such habitats in time will affect the length and weight distribution of fish as well. For this reason, annual length and weight distribution levels should be observed on a regular basis. Just to give an idea about annual length and weight distribution values, here below let us refer to data provided by Sarı (1997). We do not give any further information about these values here since detailed charts are already provided at **Growth** section,

Length-weight relationship: There is a non-linear relationship between the length and weight values of fish as given by the following equation: $W=a*L^b$ (W-weight of fish, L-length of fish, a and b are regression constants). This means that as the length of fish increases there will also be an increase in the weight of fish according to the exponential function of food capacity of the environment and fish body shape. In the equation, constant **b** gives the body shape of fish and constant **a** gives the food capacity of the environment.

The length-weight relationship of the pearl mullet population has been calculated as

W= 0.0912 $L^{2.245}$ (Sarı, 1997). Parameters of this relationship can vary with annual data, sampling size and sensitivity levels of measurement and weighing.

Size of population, mortality and survival rates: Size of pearl mullet population, mortality and survival rates are determined by “Virtual Population Analysis” technique which has been widely used in recent years. After identifying size, age and growth characteristics of fish mostly caught by professional fishery, these values have been analyzed using the technique mentioned above for the first time to determine the stock size of total inland fish in our country.

Ages	Fishing (Number)	Stock Size		F	M	Z	S
		Number	(Ton)				
I	0	465393216	7581,256	0	0.2	0.2	0,819
II	70686168	381031744	14239,156	0.228	0.2	0.428	0.652
III	137780752	248351168	12131,955	0.924	0.2	1.124	0.325
IV	36410304	80736520	4685,141	0.677	0.2	0.877	0.416
V	12132344	33575916	2199,223	0.503	0.2	0.703	0.495
VI	6524455	16620961	1228,455	0.561	0.2	0.761	0.467
VII	1280590	7768686	637,498	0.200	0.2	0.400	0.670
Total	**264814624**	**1233478144**	**42702,684**				
Virtual Population Analysis (VPA) on sampling from commercial fishing data between 1994-1995 and 1995-1996 fishign season (M-Natural mortality, F-Fishing mortality, Z-Total martality (M+F), S-Survial ratio (S= exp(-Z)							

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