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Some Biological Characteristics of Monkey Goby in Anatolia

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Abstract: In this study, age, sex compositions, mortality, age-length, age-weight, length-weight relations, condition factors monkey goby, *Neogobius fluviatilis* (PALLAS, 1814), were determined from 622 specimens between April 2006 and March 2007 caught in Manyas Lake, in the Northwest of Turkey. The age compositions of specimens were between 1-5 years and sex percentages were found as 41.64% for females and 58.36% for males. The total length varied between 5.80 and 15.60 cm and the weight ranged from 3.80 to 47.20 g. Growth of population was the most rapid at the first year of life afterwards growth ratio was slower. Growth were expressed in length and weight and the von Bertalanffy growth equations were found as, $L_t = 22.89 (1 - \exp^{-0.489 (t + 1.390)})$ and $W_t = 99.85 (1 - \exp^{-0.489 (t + 1.390)})^{2.9848}$. The following equation is for length-weight relationship, $W = 0.127 TL^{2.9848}$, $R^2 = 0.8763$. Weight increased allometrically for all sexes as seen $b = 2.9848$. It was determined that the average condition factors of ages are changed between 1.192 and 1.283 for females and 1.225 and 1.458 for males. The population has shown better growth performance than others habitats because of the lake low latitude. We have given the population parameters and characters from Northwestern part of Anatolia in Manyas Lake.

Key words: *Neogobius fluviatilis*, growth, sex ratio, condition factor, Manyas lake

INTRODUCTION

Wetlands area are important since, their ecological functions and they form rich ecosystems. They also have a great potential for economic, cultural, scientific and recreational value to life. Similarly, shallow lakes form one of the most fragile ecosystem types on earth (Barbier *et al.*, 1997).

Neogobius fluviatilis (PALLAS, 1814) is a species of fish in the Gobiidae family. *Neogobius fluviatilis*, known as monkey goby and sand goby, is very common in brackish and freshwater. It is bentopelagic and potomodromous. Monkey goby is common from Eurasia, Northern tributaries and brackish cost of the Black Sea and the Caspian Sea basin (Kottelat, 1997). *Neogobius fluviatilis* has native in Northwestern part of Turkey as Marmara Region (Geldiay and Balik, 1999; Welcomme, 1988). There is few data on their biological studies of natural habitats in Turkey.

Neogobius fluviatilis is important for minor commercial fisheries, aquarium and bait. *Neogobius fluviatilis* is listed a data deficiency species in International Union for Conservation of Nature (IUCN). It has found in Bulgaria, Hungary, Moldova, Romania, Russia, Serbia, Montenegro, Turkey, Turkmenistan and Ukraine and observed in the German part of the Rhine (Smith and Darwall, 2006).

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Manyas Lake is located to the Northwestern part of Anatolian in Marmara Region and the lake is connected with a canal to Marmara Sea. The lake is valuable as a wetland with various ecological functions. Manyas Lake is an crucial nesting and feeding place for bird species, some of those under threat of extinction. Manyas lake where birds have the mean number 3 million in each year, is one of the 9 Ramsar Wetland Area in Turkey by Ministry of Environment, in 1994. This global protection status needed the development at an environmental management plan for Manyas Lake. The situation of the lake can not provide the required environment to sustain the biodiversity because of habitat loss and lack of precipitation. Crayfish population was an important element of the lake ecosystem until 1988, the year when the population was perished by a fungi (Yarar and Magnin, 1997; Sasi and Berber, 2005).

The water level decreases in the late Spring and Summer every year because of irrigational use. When the rainfalls begin in Winter, water level increases again. The mean depth of Manyas Lake is 4-5 m. This region has a warm climate. During the study period, water temperatures varied from 8.80 to 32.40°C. The other mean of parameters were changed as follow; dissolved oxygen 6.10-10.90 mg L⁻¹, pH 7.40-8.80 and conductivity 290.50-625.10 µmhos cm⁻¹.

There is a lack of reliable biological information on age, growth parameters and population characteristics of *N. fluviatilis*, from Anatolia. The main purpose of the study has been made some biological and ecological characters of monkey goby from a lake in the Northwestern Anatolia.

MATERIALS AND METHODS

The study was carried out to determine sex, age, growth and some bio-ecological characteristics of monkey goby in Manyas Lake of Northwestern Anatolia. The study was conducted one of Ramsar wetland in natural lake from April 2006 to March 2007. Specimens were captured monthly using gill nets with 15-45 mm and cast nets with 12-22 mm mesh sizes. Catching fish was fixed in a 4% formalin solution and carried to the laboratory and measured Total Lengths (TL), total weight (WT) and recorded sex. Age was determined from microscopic examination of scales. Ten or twelve scales from the left side of the body between the lateral line and dorsal fin were taken and mounted dry between two slides for binocular microscopic study after they are prepared with some processing (Tesch, 1970).

The ratio of males and females was given. Length-weight relations were calculated by applying regression analysis by taking in of Total Lengths (TL) to total weights (WT) of each fish and the equations were as follows:

$$WT = q \times TL^b$$

where, q and b are the parameters to be estimated (Bagenal, 1978). Growth parameters, L_∞, k and t₀, were found and Von Bertalanffy growth equations for all of the fish were as follows:

$$L_t = L_{\infty} (1 - \exp^{-K(t-t_0)}) \text{ and } W_t = W_{\infty} (1 - \exp^{-K(t-t_0)})^n$$

where, L_t and W_t are total length and total weight at age t, L_∞ and W_∞ are the asymptotic fork length and total weight, respectively; K is Brody growth coefficient, which determines how fast the fish approaches L_∞ and W_∞; t the age (years) and t₀ the hypothetical age at zero length.

The condition factor of *N. fluviatilis* was estimated equation with $C = (W/TL^3) \times 100$ by using body weights (WT, g) and Total Lengths (TL, cm) (Nikolskii, 1969).

RESULTS

The study was given information on some biological traits of *N. fluviatilis* from Anatolia. The age and sex distribution of specimens caught during the study were found I-V years. The specimens of *N. fluviatilis* were sampled as 259 females and 363 males. The sex composition was determined with 41,64% females and 58,36% males (Table 1).

Females and males were distributed among age group I-V. Three-year-old group was dominant in the population with 34.57% and then following fourth-year-group with 30.55%. *N. fluviatilis* in both sexes the fork length ranged from 5.80 to 15.60 cm and the weight was ranged from 3.80 to 47.20 g. The mean total lengths and total weights of monkey goby were varied between 7.50 and 14.90 cm; 6.40 and 39.80 g, respectively (Table 2).

The growth parameters were calculated as $L_{\infty} = 22.89$ cm, $W_{\infty} = 99.85$ g, $k = 0.489$, $t_0 = -1.390$. Von Bertalanffy growth model of the *N. fluviatilis* population in Manyas Lake was described as:

$$L_t = 22.89 (1 - \exp^{-0.489 (t + 1.390)})$$

$$W_t = 99.85 (1 - \exp^{-0.489 (t + 1.390)})^{2.9848}$$

The length-weight relationship of the *N. fluviatilis* was estimated by using 622 fish specimens. The exponen (b) was estimated $b = 2.9848$. The relationship was found as;

$$W = 0.127 TL^{2.9848}, R^2 = 0.8763$$

In this study, the exponent (b) in the length-weight relationships for the all fish indicated that weight growth of monkey goby was allometric. The maximum exploration population parameters were determined with von Bertalanffy growth curve in the study. The length-weight relationships were shown in Fig. 1.

Table 1: The age and sex composition of *N. fluviatilis* in Manyas Lake (n; number of fish)

Age groups	Female		Male		Female+Male		
	n	%	n	%	n	%	Ratio
I	9	1.44	7	1.13	16	2.57	1:0.78
II	63	10.13	95	15.27	158	25.40	1:1.51
III	87	13.99	128	20.58	215	34.57	1:1.47
IV	80	12.86	110	17.68	190	30.55	1:1.38
V	20	3.22	23	3.70	43	6.91	1:1.15
Total	259	41.64	363	58.36	622	100.00	1:1.40

n: No of fish

Table 2: The Total Length (TL) and total weight (WT) of *N. fluviatilis*

Age group	Total length (cm)				Total weight (g)		
	n	Mean	Range (min.-max)	SD	Mean	Range (min.-max)	SD
1	16	7.50	5.8-9.2	0.883	6.4	3.8-11.3	2.536
2	158	10.90	9.3-12.5	0.908	17.3	7.6-29.0	4.456
3	215	12.80	12.3-13.3	0.266	24.85	20.2-34.1	2.756
4	190	13.75	13.2-14.3	0.274	34.55	22.2-44.2	3.633
5	43	14.90	14.2-15.6	0.349	39.8	27.6-47.2	4.120

SD: Standard Deviation

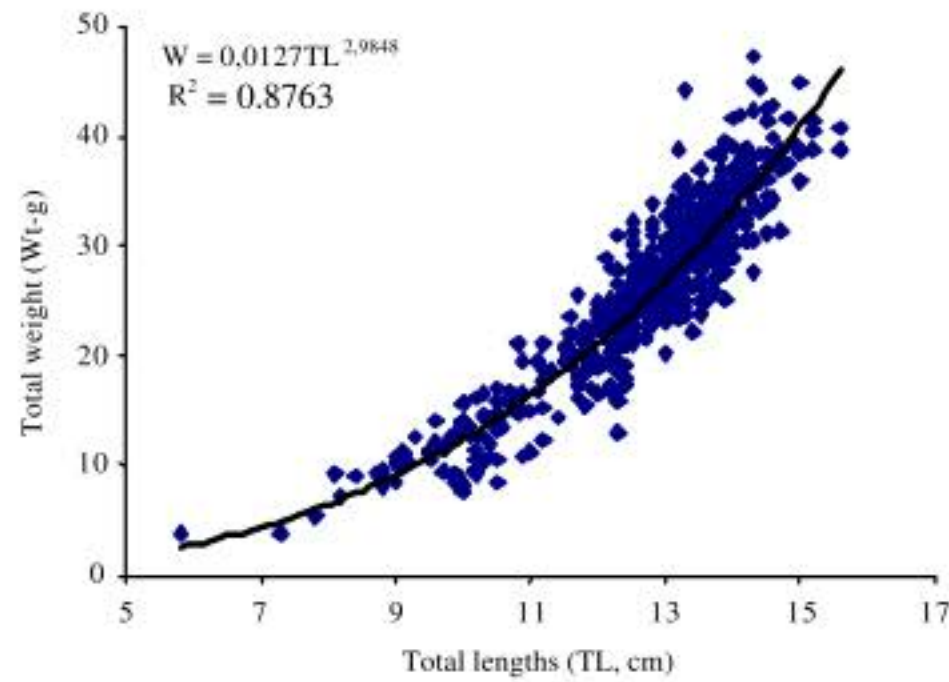


Fig. 1: Length-weight relationship in *N. fluviatilis* from Manyas Lake

Table 3: The Condition factors of age groups and both sexes of *N. fluviatilis* in Manyas lake

Age group	Female			Male		
	n	Mean (min.-max.)	SD	n	Mean (min.-max.)	SD
I	9	1.283 (1.01-1.50)	0.150	7	1.458 (1.17-1.75)	0.174
II	63	1.192 (0.84-1.67)	0.154	95	1.346 (0.76-1.64)	0.197
III	87	1.273 (1.02-1.67)	0.143	128	1.225 (0.92-1.65)	0.121
IV	80	1.231 (0.92-1.87)	0.171	110	1.259 (0.99-1.52)	0.105
V	20	1.200 (0.94-1.61)	0.173	23	1.24 (1.02-1.49)	0.116
Total	259	1.26	0.158	363	1.23	0.152

SD: Standard Deviation

The mean condition factors of *N. fluviatilis* in for sexes and age groups ranged from 1.192 to 1.283 with a mean value of 1.260 ± 0.158 and from 1.225 to 1.458 with a mean value of 1.230 ± 0.152 for females and males, respectively. It was shown that the mean condition factors were high in the early ages, then those decreased gradually with the ages for both sexes (Table 3).

DISCUSSION

The study is given some population structures of *N. fluviatilis* in a natural lake from Anatolia. There is few study about this species, which it gives some biologic traits and distribution. The distribution areas of the species have mentioned near to the Marmara Sea and Black Sea in Turkey (Geldiay and Balik, 1999). Manyas Lake is near the Marmara and Black Sea. This species is less commercial locally.

As we compared present finding to this with the diverse habitat growth parameters of monkey goby, L_{∞} , k and b values, were different from our results that they were as $L_{\infty} = 13.80$ cm (TL), $k = 0.690$ and $L_{\infty} = 14.70$ cm (TL), $k = 0.420$ in Bug Estuary and Dnepr Estuary populations in Ukraine, respectively. Also, in the Caspian Sea population from Iran is given $L_{\infty} = 20.00$ cm (TL) and $b = 3.069$. The total length of *N. fluviatilis* in Estuaries of Kuban Reservoir from Russian was showed 1.70-13.00 cm (Kottelat, 1997). The population of *N. fluviatilis* in Manyas Lake growth parameters were found $L_{\infty} = 22.89$, $k = 0.489$, $b = 2.9848$ and the total length varied from 5.80 to 15.60 cm.

The lower values of the b parameter were given in lake Manyas which is eutrophic and relatively shallow. The lake under load of organic wastes is faced with threat of becoming eutrophic (Sasi and Berber, 2005).

These fish populations of monkey goby (Ukraine and Russia) inhabiting the standing water have shown a less growth performance than the one in Northwestern Anatolia, because of the fact that there are effects of climates changes in the habitat food richness.

In this study by giving some population parameters and characters, we determined that this fish constitutes a significant population in Manyas Lake.

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