

Length-Weight Relationships of two *Clupeonella* species (Clupeidae) from Northwestern Turkey

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Received: 18.02.2020

Revision Requested: 26.02.2020

Last Revision Received: 05.03.2020

Accepted: 06.03.2020

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Citation: Aydoğan, K., & Özuluğ, M. (2020). Length-Weight relationships of two *Clupeonella* species (Clupeidae) from Northwestern Turkey. *Turkish Journal of Bioscience and Collections*, 4(1), 27–29. <https://doi.org/10.26650/tjbc.20200012>

Introduction

There are three species of genus *Clupeonella* in the Black Sea basin, *Clupeonella abrau* (Maliatsky, 1930), *Clupeonella cultriventris* (Nordmann, 1840) and *Clupeonella muhlisi* Neu, 1934 (Froese & Pauly, 2020). Two species *C. cultriventris* and *C. muhlisi* inhabit in Turkish fresh and brackish waters (Çiçek et al., 2015). All *Clupeonella* species are small in size and there are not any commercial value in Turkey. There are few studies on the length-weight relationships of *C. cultriventris* (Tarkan et al., 2006; Saç 2012; Meriç 1978). But there is not any information on the *C. muhlisi*.

The aim of this study was obtain information on length-weight relationships for these two species.

Abstract

The length-weight relationships (LWRs) of *Clupeonella cultriventris* and *Clupeonella muhlisi* were analysed. Fish samples were collected gill nets (10 mm mesh sized) from the Büyükçekmece Reservoir and Küçükçekmece Lagoon April and June 2016. Samples from Durusu Reservoir and Uluabat Lake were obtained from Istanbul University Science Faculty Hydrobiology Museum. The values of parameter b in the LWR equations varied from 3.177 (Küçükçekmece Lake population) to 3.496 (Büyükçekmece Reservoir population) for *C. cultriventris* and 3.258 (Uluabat Lake) for *C. muhlisi*.

Keywords: Length-weight relationship, Clupeonella, Uluabat Lake, İstanbul

Materials and Methods

In this study all materials belong to Uluabat Lake, Büyükçekmece and Durusu Reservoirs and Küçükçekmece Lagoon. Uluabat Lake is a large and very shallow, it is connected via Susurluk River to Sea of Marmara. Büyükçekmece Reservoir was created in 1985 to supply fresh water for the city of İstanbul by cutting of the connection between Büyükçekmece Lagoon and the Sea of Marmara. Durusu Reservoir is located on Northwestern İstanbul near Black Sea. It was created in 1883. Küçükçekmece Lagoon is located along to northern Sea of Marmara coast.

Uluabat Lake, and Durusu Reservoir individuals were museum samples, Büyükçekmece Reservoir and Küçükçekmece Lagoon samples obtained from local

fishermen. Fish specimens were collected gill-nets (10 mm mesh sized) from the Büyükçekmece Reservoir and Küçükçekmece Lagoon April and June 2016, respectively. Captured specimens were killed with an overdose of anaesthesia (clove oil), fixed in 4% formaldehyde solution and stored in 70% ethanol. Samples from Durusu Reservoir and Uluabat Lake were borrowed from Istanbul University Science Faculty Hydrobiology Museum (IUSHM) fish collection.

All samples transferred to tap water from %70 ethanol. After 10 minutes samples were taken out of the water and the water on the samples was dried with filter paper. The dried fish samples were weight for total body weight (W) on a digital balance with 0.01 g and measured for standard length (SL) to the nearest 0.1 cm accuracy. The length-weight relationship (LWR) was computed by the following equation: $W=aL^b$, where W is the total weight (g), L is the SL length (cm), a is the regression intercept and, b is slope (Le Cren, 1951;

Froese, 2006). The logarithmic transformation of this equation was performed as $\ln W=\ln a+b\ln SL$ and parameters a and b were computed by the regression analysis (King, 2007). To determine the growth type (isometric or allometric), 95% confidence limits (CI) of parameters b were calculated as follow: $95\%CI=x\pm(t_{0.05}\times SE)$ (x: b; t: table value of t (t-test at 95% confidence); SE: standard error value of b).

Results

Material Examined:

Clupeonella cultriventris Figure 1-A, B, C: IUSHM 2020-1415, 10, 5.6-7.2 mm SL, Büyükçekmece Reservoir, 25.04.2016; IUSHM 2020-1416, 10, 4.9-7.6 mm SL, Durusu Reservoir, 06.06.2001; IUSHM 2020-1417, 18, 5.3-6.6 mm SL, Küçükçekmece Lagoon, 03.06.2016.

Clupeonella muhlisi Figure 1-D: IUSHM 2020-1418, 17, 4.8-5.6 mm SL, Uluabat Lake, 24.04.2006.

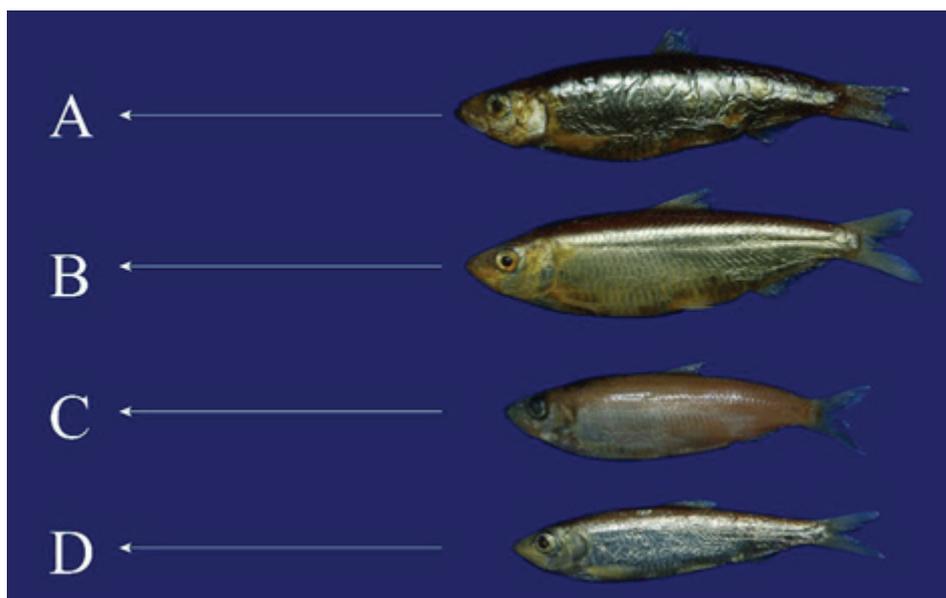


Figure 1. *Clupeonella cultriventris*: (A: Durusu Reservoir, B: Büyükçekmece Reservoir, C: Küçükçekmece Lagoon); *Clupeonella muhlisi*: D: Uluabat Lake.

Table 1. The descriptive statistics and estimated parameters of length-weight relationships of *Clupeonella cultriventris* and *Clupeonella muhlisi* populations living in the Uluabat Lake, Büyükçekmece and Durusu Reservoir and Küçükçekmece Lagoon (n: number of individuals, SL: Standard length (cm), W: body weight (g), Min: minimum, Max: maximum, a: intercept, b: slope, 95% CI: 95% confidence limit, r^2 : coefficient correlation).

Species	Locality	n	SL		W		Regression Parameters		r^2
			Min.-Max.	Min.-Max.	a	b	95% CL of a	95% CL of b	
<i>Clupeonella muhlisi</i>	Uluabat Lake	17	4.8 – 5.6	1.22 – 2.14	0.007	3.258	0.002 – 0.028	2.441 – 4.075	0.812
<i>Clupeonella cultriventris</i>	Büyükçekmece Reservoir	10	5.6 – 7.2	2.04 – 5.63	0.005	3.496	0.001 – 0.041	2.374 – 4.618	0.903
	Durusu Reservoir	10	4.9 – 7.6	1.36 – 6.84	0.006	3.432	0.001 – 0.034	2.525 – 4.339	0.921
	Küçükçekmece Lagoon	18	5.3 – 6.6	2.06 – 4.62	0.011	3.177	0.003 – 0.040	2.456 – 3.897	0.857

Individual numbers (n), length and weight ranges, a and b values in the LWR equations, 95% confidence intervals of b values and r^2 values of these two *Clupeonella* fishes were given in Table 1.

The values of parameter b in the LWR equations varied from 3.177 (Küçükçekmece Lagoon population) to 3.496 (Büyükçekmece Reservoir population) for *C. cultriventris* and 3.258 for *C. muhlisi*. The correlation coefficient between length and weight (r^2) varied between 0.857 (Küçükçekmece Lagoon population) and 0.921 (Durusu Reservoir population) for *C. cultriventris* and 0.921 for *C. muhlisi* from Uluabat Lake.

Discussion

There are only three previous reports for length-weight relationships of *C. cultriventris* from Büyükçekmece Reservoir and Küçükçekmece Lagoon (Tarkan et al., 2006; Saç, 2012; Meriç 1978), but there are not any data for length-weight relationships of *C. muhlisi* (Froese & Pauly, 2020). The slope (b) of the length-weight relationships for all three *C. cultriventris* populations was within the expected range of 2.5–3.5 (Froese & Pauly, 2020). The slope (b) of the LW relationships was 2.7275 and 3.380 for Büyükçekmece Reservoir (Tarkan et al., 2006; Saç 2012), 3.4284 for Küçükçekmece Lagoon (Meriç, 1978).

Peer-review: Externally peer-reviewed.

Author Contributions: Conception/Design of study: M. Ö., K. A.; Data Acquisition: M. Ö., K. A.; Data Analysis/ Interpretation: M. Ö.; Drafting Manuscript: M. Ö., K. A.; Critical Revision of Manuscript: M. Ö., K. A.; Final Approval and Accountability: M. Ö., K. A.;

Conflict of Interest: The authors declare that they have no conflicts of interest.

Financial Disclosure: The present study was supported by the Scientific Research Projects Coordination Unit of the Istanbul University. (Project no: 21482).

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