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A study on length-weight relationship and condition factor of *Alburnus mossulensis* in Hamzeh-Ali Region from Chaharmahal and Bakhtiari Province, Iran

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Abstract
The present study was conducted to analyze the Length-Weight relationship (LWR) and Condition Factor of the *Alburnus mossulensis* in Hamzeh-Ali Region from Chaharmahal and Bakhtiari Province. For this purpose, 40 specimens of *A. mossulensis* were sampled in Hamzeh-Ali Region. Fish were digitally weighted at 0.01g and the total length was obtained using ImageJ software to the nearest 0.1 mm. The total length of fish was 19.2-74.1 mm and weight range was 0.05-2.93 g. The LWR was highly significant ($P< 0.01$) for *A. mossulensis* with R^2 value =0.98. In this study, the mean value of 'b' was 3.09. Length-weight relationship indicated positive allometric growth for *A. mossulensis*. Also, the mean condition factor was 0.71. This study will contribute to the knowledge on fishery resources in Hamzeh-Ali Region from Chaharmahal and Bakhtiari Province.

Keywords: *A. mossulensis*, Length, Weight, Condition factor, Hamzeh-Ali Region.

1. Introduction
Growth of an organism means a change in length or weight or both with the Increase in age [1]. Length–weight relationship (LWR) was used to determine the growth patterns of fish populations [2]. LWR is widely used for fish stock assessment [3, 4]. The empirical relationship between the length and weight of the fish enhances the knowledge of the natural history of commercially important fish species, thus making the conservation possible [5]. Therefore, LWR is a simple but essential in fishery management [4, 6]. The condition factor is used in order to compare the condition or fitness of fish populations. Also, Condition factor helps to reflect the feeding conditions of the fish [2, 5].
A. mossulensis (belonging to Cyprinidae) lives in rivers, streams, reservoirs and lakes [7]. It feeds on phytoplankton (algae and diatoms), plants and crustaceans. This species is found in the Tigris-Euphrates basin and adjacent basins. In Iran, it is recorded from the Tigris River, Gulf basin, Kor River, Chaharmahal and Bakhtiari Province, Lake Maharlu and upper reaches of the Hormuz basins [8]. There is a great need for studies of biology, ecology and conservation status of this fish in Iranian freshwaters.
The present study aimed to analyse length-weight relationship and condition factor of *A. mossulensis* in Hamzeh-Ali Region from Chaharmahal and Bakhtiari Province, Iran. The study would be useful for further studies on population assessment and sustainable conservation of *A. mossulensis*.

2. Materials and Methods
In this study, 40 individuals of *A. mossulensis* were caught from Hamzeh-Ali Region (E: 50° 58', N: 31° 55'), Chaharmahal and Bakhtiari Province (Figure 1), using dip net on September 2014. The collected specimens were fixed in 4% formalin and transported to the laboratory. Fish were digitally weighted at 0.01g and the total length (TL) was obtained using ImageJ software to the nearest 0.1mm. The length-weight relationships were estimated by using following equation [5]: $W= aL^b$, Where L is the total length (cm), W is the body wet weight (g), a is the intercept of the regression and b is the regression coefficient [9]. Also, the condition factor (K) was calculated with the following formula $K=100W/L^3$ [10] to estimate the general wellbeing of the fish, where W is the weight of the fish in grams (g) and L is the length of the fish in centimetres (cm) [3, 11].

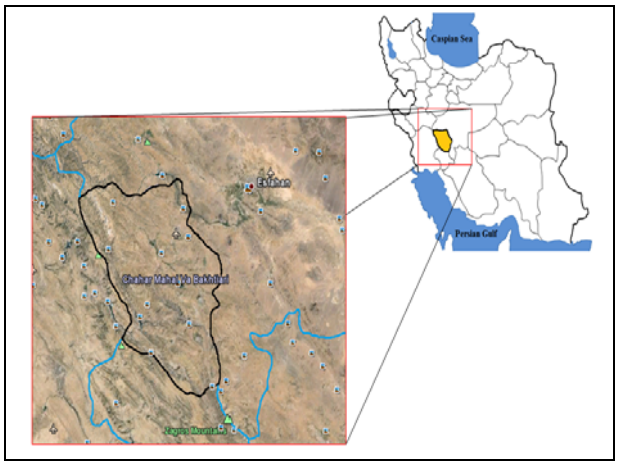

Fig. 1: Location of Chaharmahal and Bakhtiari Province in Iran

3. Results and Discussion

In the present study, weight range of 0.05 to 2.93 g and total length range of 19.2 mm to 74.1 mm were utilized. The length-weight relationship curve of *A. mossulensis* in Hamzeh-Ali Region is shown in Figure 2.

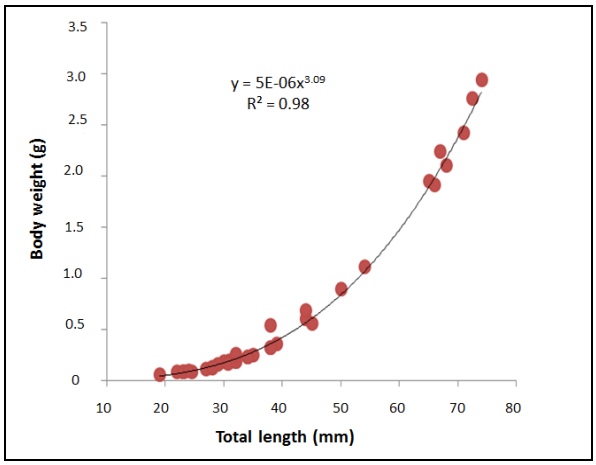

Fig. 2: The length-weight relationship curve for *A. mossulensis* in Hamzeh-Ali Region from Chaharmahal and Bakhtiari Province, Iran

The LWR was highly significant ($P < 0.01$) for *A. mossulensis*, with R^2 value = 0.98. The determination coefficient (R^2) was used as an indicator of the quality of the linear regressions [12]. In this study, the mean value of 'b' was 3.09 in fish. The range of b could be from 2.5 to 4 or 2 to 4 and b=3 in fish population with isometric growth [2]. The variation in 'b' value is due to physiological factors, sex, life stage, food availability, seasons and environmental parameters [1]. LWR parameters (a and b) of the fish have been reported to be affected by a number of factors like season, habitat, gonad maturity, sex, diet and etc. [2]. Length-weight relationship indicated positive allometric growth for *A. mossulensis* (b> 3). Mousavi-Sabet *et al* (2014) [13] studied Length-weight relationship of *A. mossulensis* in Iran. They reported the LWR parameters: b=3.27, a=0.0041 with R^2=0.96. Also, growth pattern of fish was positive allometric, the length range of fish was 66-142 mm and average weight was 8.62 g. This result was similar to our study results. In the present study, the condition factor for fish was 0.71. Kumolu and Ndimele (2010) [9] stated the condition factor reflects through its variation, information on physiological states of fish with relation to welfare. In studies of population dynamics high condition factor values indicates favorable environmental conditions [14]. In present study, condition factor value <1 and indicated unsuitable conditions for *A. mossulensis* in this Region.

4. Conclusion

In conclusion, the present study provides the first basic information about the length-weight relationship and condition factor of *A. mossulensis* in Iran. The results obtained from this study will contribute to the knowledge on fishery resources in Hamzeh-Ali Region from Chaharmahal and Bakhtiari Province.

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