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# RELATIONSHIP OF LENGTH AND WEIGHT AND CONDITION FACTOR OF THE SHILLUK (*LEUCISCUS VORAX*) (HECKEL) AT RUMAITHA, IRAQ

**Hassan A. Fazaa, Kareem Z. Negaud and Abbas S. Alhamadani**
Animal Production Department, Agriculture College, Al-Muthanna University, Iraq.
Corresponding author: hassanawied7474@gmail.com

## Abstract

A total of 210 Shilluk (*Leuciscus vorax*) samples were collected from *Leukiscus vorax* in Rumaitha district, from July 2017 to June 2018. A sample of fishing for each month using electric fishing. Some physical and chemical properties of water were measured at the collection site, water temperature ranged from 31 ° C in July 2017 to 13 ° C in January 2018, dissolved oxygen concentrations in water ranged from 8.50 mg / l in January 2018 to 6.32 mg / l in July 2017, the pH values were between 7.7 in July 2017 to 6.82 in January 2018, salinity recorded values ranging from 0.73 g / l in January 2018 to the highest value in July 2017 at 1.21 g / l, total fish lengths ranged from 7.3 cm to 49 cm and total weights between 3.4 and 700 g. The growth of the fish is the same, where the value of b for the total length relationship to the total weight is 2.97, the log is described in logarithmic form Log W = -2.13 + 2.97 log L, condition factor was 0.70 and the fish ages ranged from +0 to +3 years.

***Keywords*:** Length, weight, condition factor, Shilluk (*Leuciscus vorax*), Rumaitha.

## Introduction

Shilluk *(Leuciscus vorax* ) is one of the species in the Iraqi inland waters, Cyprinidae carp family, They were found in rivers and lakes of Turkey, Syria, Iraq and Iran, a predatory fish characterized by the large number of inter bone in the meat, the length is more than 60 cm (Mahdi, 1962). This species was found in the Tigris and Euphrates basin, as well as in the Orontes basin in the Middle East. In Iraq, this species was recorded in the Shatt al-Arab River, in the southern marshes and rivers such as the Tigris, Euphrates, Diyala and Zab al-Saghir, as well as small streams and lakes such as Habbaniyah, Tharthar and Razaza. reservoirs such as Lake Qadisiyah Dam on the Euphrates River and Dukan Dam (Coad, 2010). The relationship of height and weight is an important vital indicator in the field of fish farming, mathematical equations can be obtained for the mutual conversion of height and weight and determining the nature of fish growth whether it is Isometric or Allometric (1975, Ricker; 1978, Bagenal and Tesch). The condition factor was a measure of the deviation of a state, health or fullness of a fish from the average height by weight within a group (Le Cren, 1951), the value of the condition factor indicates how the weight of the gonads and the contents of the stomach affect the weight of the fish and that gonads increase the weight of the fish by up to 15%, influenced by factors such as sexual maturity, ovulation, sex, mortality and contamination, as well as living and non-life environmental conditions, can be used as an indicator to assess the state of the fish ecosystem (Alhassan *et al*., 2015). Numerous studies have been conducted on some life aspects of Shilluk fish in Lake Habbaniyah, Hor Al Hammar, Tharthar Lake, Shatt Al-Basra Canal, Razaza Lake and Artificial Lakes near Baghdad (Al-Mukhtar, 1982; Al-Daham and Al-Dabikel, 1995; Abu Al-Hani and Al-Nassiri, 2005; Shaker, 2014). The present study aims to study the relationship of height and weight and the condition factor of Shilluk fish in the Rumaitha River, northern Muthanna governorate, southern Iraq.

## Material and Methods

**Study area:** The Rumaitha River is the end of the Hilla Shatt, which is one of the main branches of the Euphrates, It has a length of 36.60 km, the width of the river in the study area 30-35 m, depth between 3-5 m.

**Sample collection:** The fish samples were collected monthly, for a whole year using electric fishing. The fish were placed in cork containers with ice in the summer months and then placed in the frozen at -20 °C until the measurements were made.

**Laboratory work:** Frozen fish were washed with water to get rid of excess ice, the fish were dried and the total length of the nearest 1 mm was calculated using a wooden ruler, numerical measurements were recorded using the digital foot, the fish individually weighed to the nearest 0.1 g using a sensitive scale, the fish age was calculated by taking a set of scales from the dorsal fin over the lateral line (Ahmed, 1987), the scales were placed in paper wrappings with the data for each fish, Put the scales per fish in a glass dish, 4% KOH solution was added, left for 24 hours to dissolve the tissue, rubbed with a cloth and washed with water to dispose of the KOH solution, placed on a filter paper for drying, put 4-7 scales between two glass strips and tied with adhesive tape, recorded the information about each thickness, use the compound microscope and magnify 1.5 Fish.

**The relationship of total height to weight:** The logarithmic equation log W = a + b log L (Pauly *et al*., 1993), was used to find the relationship between total length L and weight W of fish.

**Condition factor:** The condition factor was calculated according to the following equation: (Ahmed, 1987) $C.F = W / L3 \times 100$

C.F: condition factor, W: total weight, L: the total length.

## Results and Discussion

**Frequency distribution of length totals:** Figure (1) shows the frequency distribution of the lengths of the fish caught in Rumaitha district, which was divided into fourteen groups of length with a 3 cm long comma, fish lengths ranged from 7.3 to 49 cm, the highest number in the length group was 13.1-16 cm and 17.61% of the total number and within the age group + 0, the lowest number was found in large height groups,

which were greater than 43 cm and by three fish per group length and 1.42% of the total number.

The recording of the largest number of fish in small length groups may be due to the fishing method used and to the over fishing that leads to the disappearance of large volumes and the registration of the smallest number in the catch. It may be due to lower river levels during the sampling period, which significantly affected the presence of fish at the sampling sites.

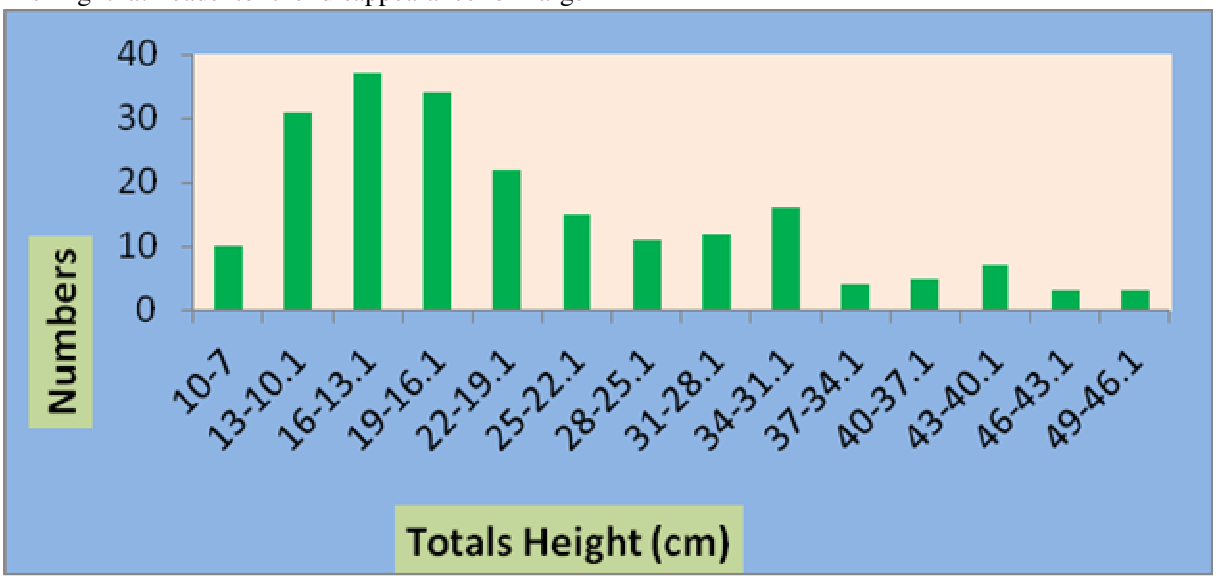


**Fig. 1 :** Frequency distribution of ranges of lengths of Shilluk fish during the study period.

**The relationship of total height to weight:**

Al-Mukhtar (1982) stated that the relationship of total height to weight is calculated for each sex separately when the number of fish is large and for both sexes when the numbers are low. The relationship between total height and weight for both sexes is shown in the following logarithmic form:

$$\text{Log } W = -2.13 + 2.97 \log L \ (n = 210) \ (r = 0.93)$$

b value was very close to 3 as it was 97.2, which indicates that the growth of Shilluk at the study site is standard, that the fish have grown uniformly in length and weight,

The values of b may be close to 3 as the results of this study were due to homogeneity of height and weight groups in this region, or as a result of water quality, especially high levels of oxygen (Otieno *et al*., 2014), the b value was greater than 3 when the fish increases by weight at the expense of length and when the increase by length at the expense of the weight, the value of b is less than 3, if the value is 3, the increase in height and weight is the same (Ibrahim, 1984). Olurin and Aderibigbe (2006) noted that the regression coefficient (b) differs not only between species but sometimes between stocks of the same species.

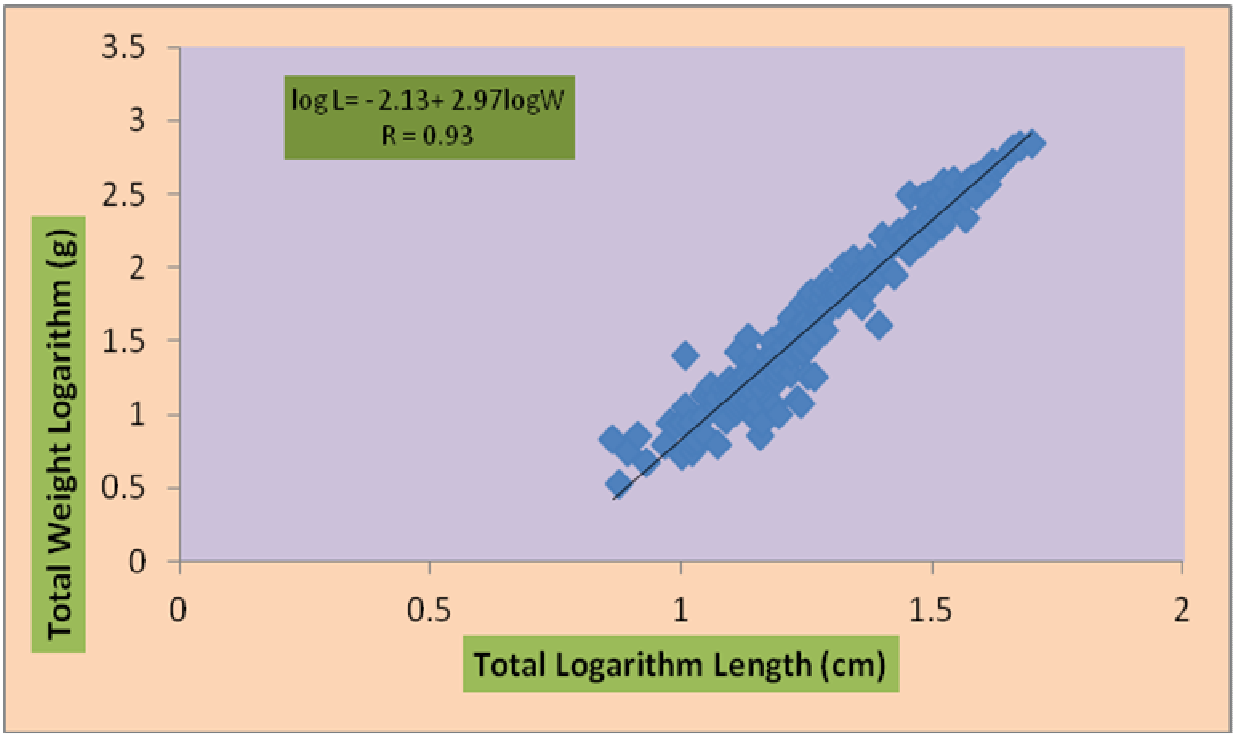


**Fig. 2 :** The logarithmic relationship between the total length and weight of the Shilluk during the study period

**Condition factor:**

Table 1 shows that the condition factor of male and female Shilluk at the study site was not associated with different length groups, gradual decrease in condition factor values in small length totals, values fluctuated between decreases and increases in subsequent length totals, these differences may be due to the development of gonads, age and annual changes in growth and nutrition (Ricker, 1975). The condition factor averaged 0.70, which is lower than that recorded by Al-Mukhtar (1982) for this species in Hur Al-Hammar (1.15) and Oymak *et al*. (2011) in Lake Ataturk Dam (1.23).

This is an indication that the shilluk at the site of the study were not in good health, which may be due to the time of sampling or the rise in fishing effort, or may be due to the small size of the river and low water levels and slow runoff. The smallest length group was the best of the immediate length groups with a case coefficient of 0.95, while the lowest case coefficient of the most long length group in the catch was 0.59.

**Table 1 :** Condition factor according to the different length groups of the fish in the study period.

| Totals Height (cm) | Numbers | Average total Length (cm) | ±Standard deviation | Weight mean (g) | ±Standard deviation | Condition factor |
|---|---|---|---|---|---|---|
| 7-10 | 10 | 8.78 | 0.99 | 6.48 | 1.72 | 0.95 |
| 10.1-13 | 31 | 11.95 | 0.96 | 12.97 | 4.72 | 0.76 |
| 13.1-16 | 37 | 14.57 | 0.85 | 18.54 | 6.89 | 0.59 |
| 16.1-19 | 34 | 17.6 | 0.85 | 34.67 | 6.89 | 0.63 |
| 19.1-22 | 22 | 20.4 | 0.9 | 70.17 | 16.34 | 0.82 |
| 22.1-25 | 15 | 23.35 | 0.87 | 81.32 | 19.03 | 0.63 |
| 25.1-28 | 11 | 26.73 | 0.91 | 146.68 | 28.05 | 0.76 |
| 28.1-31 | 12 | 29.68 | 0.72 | 211.28 | 58.25 | 0.8 |
| 31.1-34 | 16 | 32.5 | 0.83 | 254.9 | 51.37 | 0.74 |
| 34.1-37 | 4 | 36.1 | 0.9 | 298.25 | 64.01 | 0.63 |
| 37.1-40 | 5 | 38.2 | 0.7 | 374 | 34.84 | 0.67 |
| 40.1-43 | 7 | 41.8 | 0.75 | 469.28 | 43.29 | 0.64 |
| 43.1-46 | 3 | 44.93 | 1.11 | 586.66 | 55.42 | 0.64 |
| 46.1-49 | 3 | 47.96 | 0.73 | 681 | 13.73 | 0.61 |
| Total | 210 | | | | | 0.70 |

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