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## Is there any variation between the clutch and egg size of the common moorhen *Gallinula chloropus* breeding on Lake Tonga in Northeast of Algeria?

Hassiba Zediri<sup>1\*</sup>, Adnène Ibrahim Belabed<sup>1,2</sup> and Zihad Bouzlama<sup>1</sup>

<sup>1</sup>Laboratory Ecology of Terrestrial and Aquatic Systems, Badji Mokhtar University, Annaba, Algeria

<sup>2</sup>Departement of Ecology and Vegetable Biology, Ferhat Abbas University, Sétif, Algeria

### ABSTRACT

Clutch and egg size variation of the common moorhen, *Gallinula chloropus*, was studied in Northeast of Algeria in the Tongalake, classified by the Ramsar convention as a natural biosphere reserve. A total of 230 eggs from 43 clutches were measured during the breeding season 2012. Mean clutch size was  $5.357 \pm 3.129$  (range 1-14). Average values of the egg dimensions are as follows: egg length  $42.424 \pm 3.945$  mm, egg breadth  $29.451 \pm 3.297$  mm and egg volume  $19.124 \pm 3.756$  cm<sup>3</sup>. Egg dimensions were correlated; There was no significant relationship between clutch size and egg measurements.

**Key words:** *Gallinula chloropus*, clutch size, egg size, breeding values, Tongalake.

### INTRODUCTION

The classification of the avian order Gruiformes has been one of the least stable in the taxonomic history of birds. The common moorhen (*Gallinula chloropus*) is a member of the secretive rail family (Rallidae) which exploits a wide spectrum of habitats ranging [1].

Regional declines in moorhen populations have been attributed to loss or degradation of emergent wetland habitats. This bird appears to have extended its range in the last century [2], but is thought to be less abundant than in the early 1900s due to the filling of wetlands[3].

The Common Moorhen has been studied extensively in Europe [4-8], and North America[9-13]. Despite the fact that the moorhen is often the most common breeding bird in Algeria, however, little has been published about the breeding biology of this bird.

There are hardly any data available from this area[14]. Herein, we amplify the findings of the earlier study, by presenting more information on the breeding biology of the species.

This is why the main aim of this study was to test the hypothesis of the optimal egg dimensions that predicts a trade-off between the number and size of propagules produced [15]; and we have tested the correlation between the clutch size, egg mass, and egg dimensions. These correlations in water birds in large have been rather poorly investigated.

### MATERIALS AND METHODS

The study was conducted at Tonga lake, classified by the Ramsar convention, as a natural biosphere reserve, belonging to El Kala National Park. This lake is located in the extreme eastern north of Algeria, at 36 ° 51 'N and 08 ° 30' E. It is of 2500 hectares with an average depth of 1.5m and connected to the sea by a channel of one kilometer. In spring and summer, the lake is invaded (75%) by an emerging and floating vegetation consisting mainly of

common reed (*Phragmites communis*), Lesserbulrush (*Typha angustifolia*), Iris (*Iris pseudacorus*), *salix pedicellata*, Cattail lake (*Scirpus lacustris*) and white waterlily (*Nymphaea alba*). Tonga lake is an important wintering site and nesting water birds.

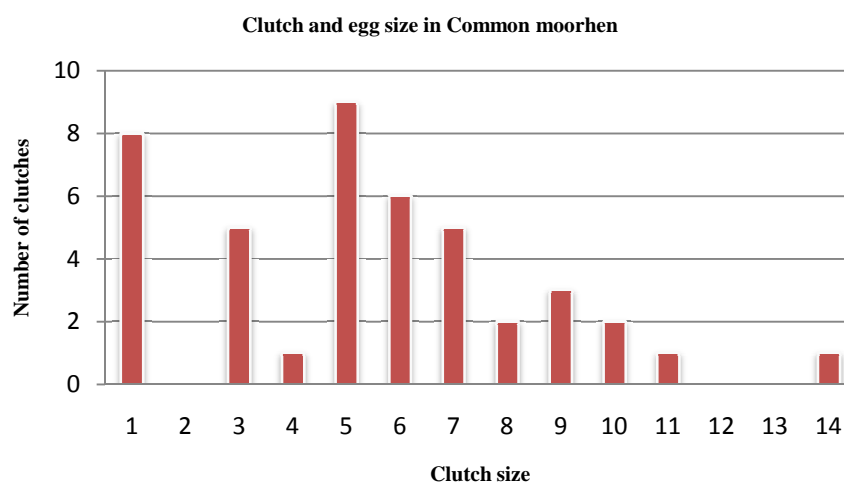
The eggs were collected in 2012, during the breeding season (i.e. the period between April until June). Nests were located by systematic walking through vegetation. A total of 43 nests with complete clutches were found. A weekly monitoring at Tonga lake was realized. During this period the visits allowed, firstly, to locate the nests and secondly, to collect the demographic parameters namely the laying period, the size of clutch the biometrics of each egg (the number of eggs  $n = 230$ ). Weight, length (L) and breadth (B) of the eggs were measured using an electronic scale and a caliper (0.1mm). The volume (V) of eggs was estimated using the equation of Hoyt 1979:  $V = 0.000507 LB^2$ . All parameters are calculated and presented by mean and standard deviation with Microsoft Excel 2013 software. Data processing was performed using the STATISTICA software (10.0.1011, 2011) to clarify existing correlations between the different parameters studied.

## RESULTS AND DISCUSSION

In Tonga lake, the first egg was laid on the 19th of April 2012, the last one on the 13th of June 2012. Clutches contained from 1 to 14 eggs (Figure 1). Mean clutch size was  $5,357 \pm 3,129$ . Mean values of the egg dimensions were as follows: egg length  $42,424 \pm 3,945$  mm ( $n = 230$ ), egg breadth  $29.451 \pm 3.297$  mm ( $n = 230$ ) and egg volume  $19,124 \pm 3,756$  cm<sup>3</sup> ( $n = 230$ ).

These data concerning the breeding of the Common moorhen, which lasted from the beginning of April until June, is later than in most of the Western Palearctic [16] but in agreement with that reported by a previous work on North Africa and even in Algeria [14]. Those authors suggested that the timing of laying was related to growth of emergent vegetation and that rearing of broods takes a long time, which do not allow for a second broods. Mean clutch size at Tonga lake was slightly smaller than those recorded in Algeria ( $7.8 \pm 2.9$ , [14]), probably related to relative food abundance between years [17]. Several nests (08) with only one single egg were founded; one-egg complete clutches are rare in bird species with multi-egg clutches; This is not exceptional among the Algerian populations of rails, the case of coots population [18].

The mean values for egg size (length, breadth, volume) obtained in our study are smaller than those reported in other works around the world, but follow in the range reported by F. Samraoui and *al*; 2013 for the Algerian population of Common moorhen ( $L = 42.9 \pm 1.3$ ,  $B = 30.2 \pm 0.8$ ,  $n = 475$  eggs). This is probably resulting from the influence of local scale factors [19].



**Figure 1.** Frequency distribution of clutch size in the common moorhen population breeding on Lake Tonga in 2012 ( $n = 43$ )

As the clutch size increased the average egg weight decreased ( $r = -0.200$ ) (Figure 2) Such a relationship was recorded in coots [20]. With the increase of the clutch size, the egg length and egg breadth increased, although there is no correlation between these parameters. Only minor correlations were recorded in a few passerine species which were investigated in Europe ([21, 22]), A. Uzun and *al*; 2010, suggested that the trade-off between the clutch size and egg measurements has no adaptive value for birds.

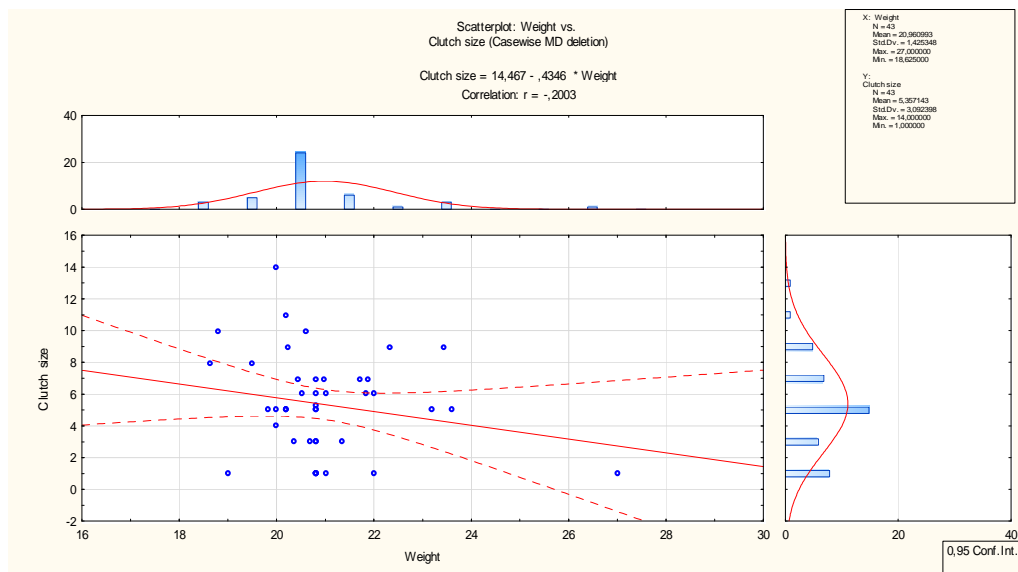


Figure 2. Correlation between egg weight and clutch size

The correlation between length and breadth was highly significant (Pearson’s correlation;  $r=0.915$  at  $p<0.05$ ,  $n=43$ ) (Figure 3), Egg dimensions (length, breadth and volume, respectively) did not depend on the clutch size (Figure 4).

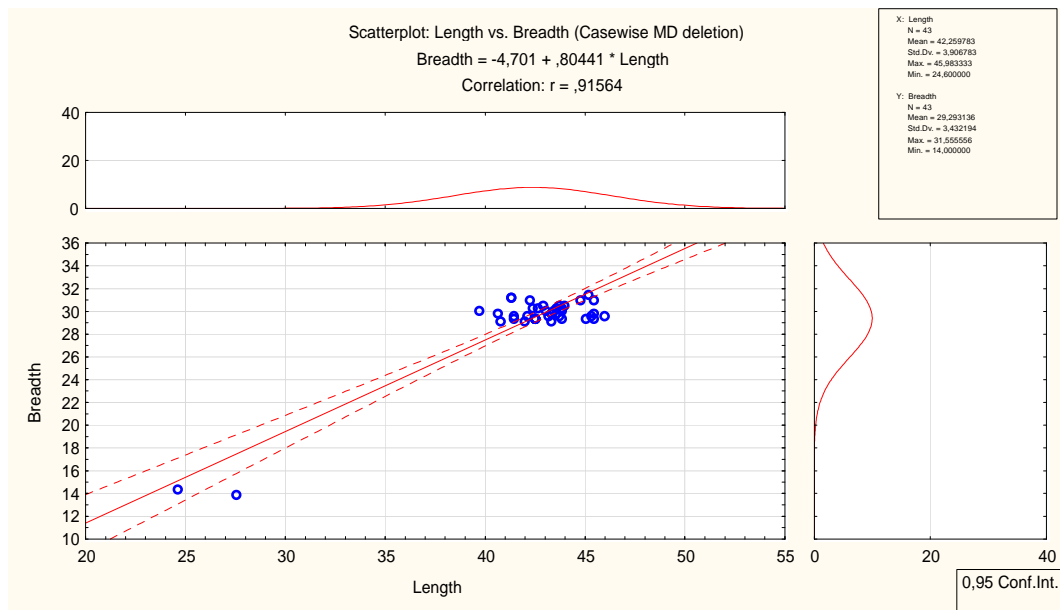


Figure3. Correlation between egg Length and egg Breadth

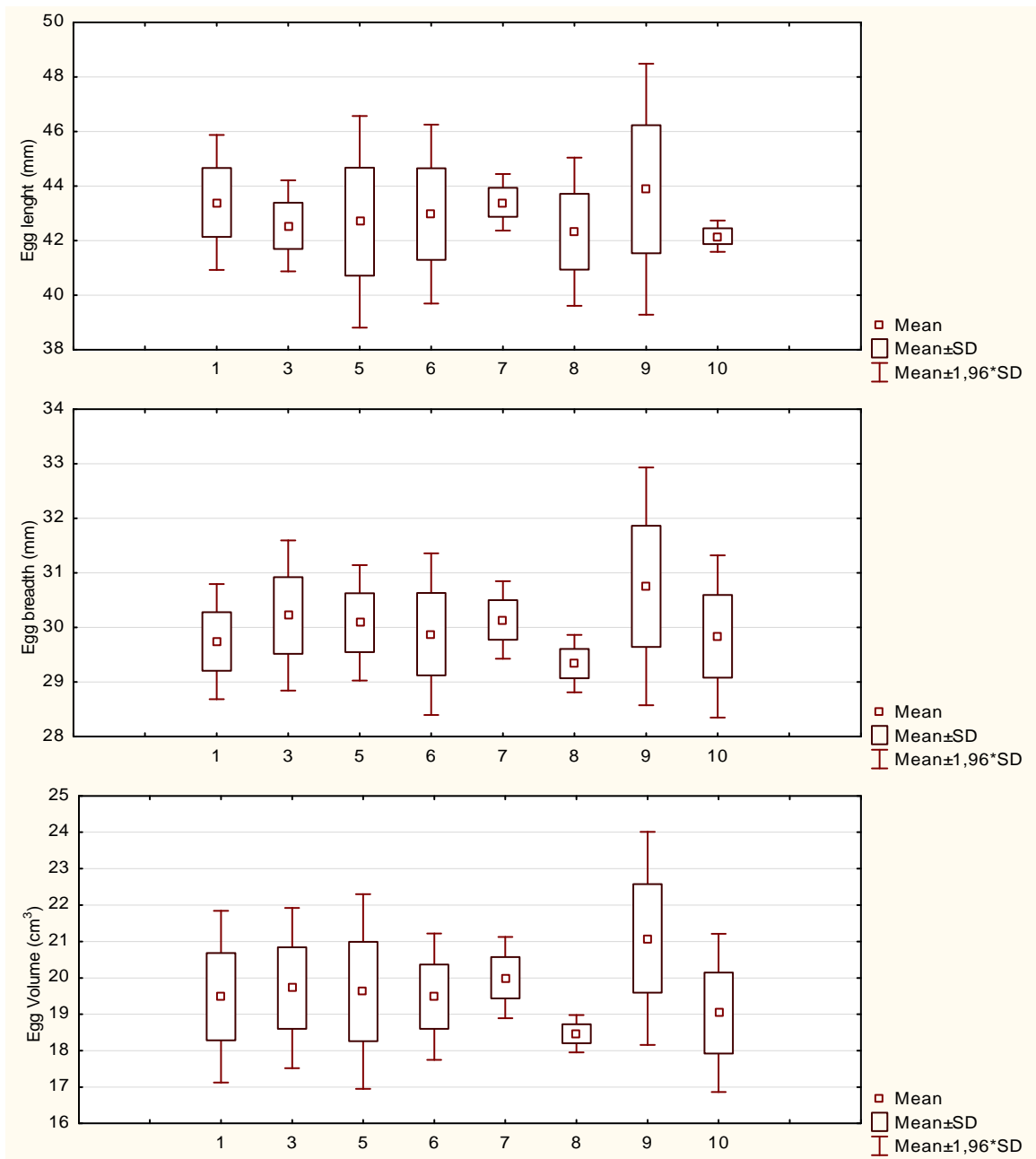


Figure 4. Variation in egg dimensions with clutch size. Due to small sample size clutches containing 4, 11 and 14 were excluded

### CONCLUSION

This study indicates that there was no significant correlation between egg dimensions and clutch size in common moorhen. This confirms that clutch and egg size are independent of each other as has been demonstrated in several bird species [23].

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