

## Ecology of the serotine bat *Eptesicus serotinus* (Schreber, 1774) in Nagorno-Karabakh

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The paper presents the results of the first study of the environmental features of *Eptesicus serotinus* in Nagorno-Karabakh. Particular attention is paid to changes in the thermal regime of shelters, types of activity, fluctuations in numbers over the years, as well as some issues of reproduction.

Key words: Karabakh, fauna, serotine bat

### INTRODUCTION

The fauna of Nagorno-Karabakh is rich and varied, and the order Chiroptera with its diversity has a special place. Among the mammals, known for our conditions, there are 27 species of Chiroptera, i.e. 28.7% of the total number. As strange as it may seem, some issues relating to the bats, especially the ecology and biology of the serotine bat, need to be studied and clarified.

### MATERIALS AND METHODS

Collection of the materials and field observations were carried out from 1999 to 2014. We captured flying animals with mist nets and butterfly-nets. To catch the animals out of the holes of walls, we used pincers and wires. While collecting and working out the material and during field observations we apply the classical methods, accepted in theriology and ecology (Kuzyakin 1950; Yavruyan 1991; Yavruyan, Hayrapetyan 2003; Hayrapetyan 2004, 2014). We counted the numbers of serotine bats just when they emerged from their hiding places, using Pettersson D 200 ultrasonic detector. We recorded the ultrasounds on the detector to recognize the species afterwards. Altitudes of finding places were determined with Magellan GPS 315 electronic navigation equipment.

### RESULTS AND DISCUSSION

There is no accurate information on the number of these animals in Nagorno Karabakh, however the data presented here can indirectly reflect the density of their habitation. Until 2004 only two individuals (1 ♂ and 1 ♀) of this species were found in Karabakh, later on their number grew to 74 (Table 1).

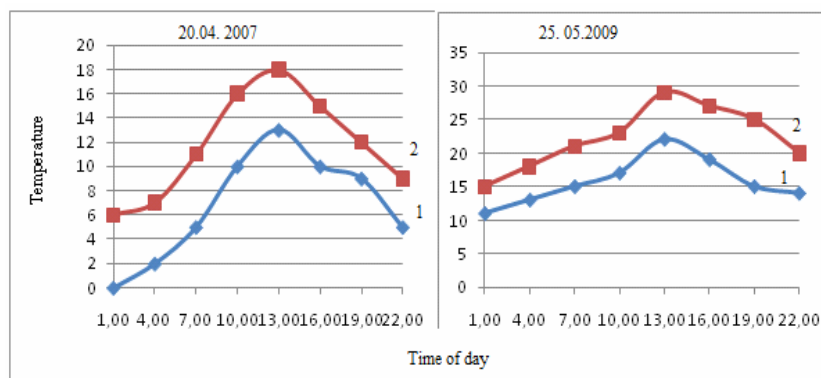
**Table 1. Numbers of captured individuals and sex-age structure of the serotine bat in different areas of Nagorno-Karabakh. Age in years****Таблица 1. Количество пойманных особей и половозрастная структура позднего кожана в разных районах Нагорного Карабаха. Возраст в годах**

| Age   | Sex | Martuni |      | Akna (Aghdam) |      | Martakert |      | Tumi |      | Shoushi |      | Total |      |
|-------|-----|---------|------|---------------|------|-----------|------|------|------|---------|------|-------|------|
|       |     | n       | %    | n             | %    | n         | %    | n    | %    | n       | %    | n     | %    |
| 1     | ♂   | 1       | 25.0 | —             | —    | 1         | 25.0 | 1    | 25.0 | 1       | 25.0 | 4     | 5.4  |
|       | ♀   | —       | —    | 1             | 50.0 | —         | —    | 1    | 50.0 | —       | —    | 2     | 2.7  |
| 2     | ♂   | 2       | 50.0 | 1             | 25.0 | 1         | 25.0 | —    | —    | —       | —    | 4     | 5.4  |
|       | ♀   | 1       | 20.0 | —             | —    | 2         | 40.0 | 1    | 20.0 | 1       | 20.0 | 5     | 6.8  |
| 3     | ♂   | —       | —    | 2             | 50.0 | —         | —    | 1    | 25.0 | 1       | 25.0 | 4     | 5.4  |
|       | ♀   | 1       | 33.3 | 1             | 33.3 | —         | —    | —    | —    | 1       | 33.3 | 3     | 4.05 |
| 4     | ♂   | —       | —    | —             | —    | 2         | 40.0 | —    | —    | 3       | 60.0 | 5     | 6.8  |
|       | ♀   | 2       | 40.0 | 1             | 20.0 | —         | —    | 2    | 40.0 | —       | —    | 5     | 6.8  |
| 5     | ♂   | 1       | 20.0 | 2             | 40.0 | 2         | 40.0 | —    | —    | —       | —    | 5     | 6.8  |
|       | ♀   | 2       | 33.3 | 1             | 16.7 | 1         | 16.7 | 1    | 16.7 | 1       | 16.7 | 6     | 8.1  |
| 6     | ♂   | —       | —    | —             | —    | —         | —    | 1    | 100  | —       | —    | 1     | 1.35 |
|       | ♀   | —       | —    | 1             | 33.3 | 2         | 66.7 | —    | —    | —       | —    | 3     | 4.05 |
| 7     | ♂   | —       | —    | —             | —    | —         | —    | 1    | 33.3 | 2       | 66.7 | 3     | 4.05 |
|       | ♀   | —       | —    | 1             | 50.0 | —         | —    | —    | —    | 1       | 50.0 | 2     | 2.7  |
| 8     | ♂   | 1       | 50.0 | —             | —    | —         | —    | 1    | 50.0 | —       | —    | 2     | 2.7  |
|       | ♀   | —       | —    | 1             | 50.0 | 1         | 50.0 | —    | —    | —       | —    | 2     | 2.7  |
| 9     | ♂   | —       | —    | —             | —    | 1         | 100  | —    | —    | —       | —    | 1     | 1.35 |
|       | ♀   | 1       | 50.0 | —             | —    | —         | —    | —    | —    | 1       | 50.0 | 2     | 2.7  |
| 10    | ♂   | —       | —    | 1             | 50.0 | —         | —    | 1    | 50.0 | —       | —    | 2     | 2.7  |
|       | ♀   | 2       | 50.0 | —             | —    | 2         | 50.0 | —    | —    | —       | —    | 4     | 5.4  |
| 11    | ♂   | —       | —    | —             | —    | 1         | 100  | —    | —    | —       | —    | 1     | 1.35 |
|       | ♀   | 1       | 50.0 | —             | —    | 1         | 50.0 | —    | —    | —       | —    | 2     | 2.7  |
| 12    | ♂   | —       | —    | —             | —    | —         | —    | —    | —    | —       | —    | —     | —    |
|       | ♀   | 2       | 100  | —             | —    | —         | —    | —    | —    | —       | —    | 2     | 2.7  |
| 13    | ♂   | 1       | 100  | —             | —    | —         | —    | —    | —    | —       | —    | 1     | 1.35 |
|       | ♀   | —       | —    | —             | —    | —         | —    | —    | —    | —       | —    | —     | —    |
| 14    | ♂   | 1       | 100  | —             | —    | —         | —    | —    | —    | —       | —    | 1     | 1.35 |
|       | ♀   | 1       | 50.0 | —             | —    | 1         | 50.0 | —    | —    | —       | —    | 2     | 2.7  |
| Total | ♂   | 7       | 20.6 | 6             | 17.6 | 8         | 23.5 | 6    | 17.6 | 7       | 20.6 | 34    | 46.0 |
|       | ♀   | 13      | 32.5 | 7             | 17.5 | 10        | 25.0 | 5    | 12.5 | 5       | 12.5 | 40    | 54.0 |
|       | ♂+♀ | 20      | 27.0 | 13            | 17.6 | 18        | 24.3 | 11   | 14.9 | 12      | 16.2 | 74    | 100  |

Our observations in Akna (410 m a.s.l.) in the year 2006 showed that there were 5–6 individuals *per* 1 km<sup>2</sup>, i.e. they were common there. In 2007 they were also common in Qmqadzor and Martakert (680 m a.s.l.). There were up to 17 individuals *per* 1 km<sup>2</sup> in the territory of Martuni in 2008. In 2010 we found 5 individuals in the territory of Karvachar (1850 m a.s.l.). The latter habitat is situated much higher of the reported maximum altitude of distribution of the species (1100 m a.s.l. – see Schober, Grimmberger 1998).

The results of our studies, conducted in different landscape zones, have shown that among Chiroptera from the lowland zone the number of the serotine bat made up 6.3%, from the foothills – 3.1%, from the middle-mountain zone – 3.2%, from the high-mountain zone – 7.6%.

According to their habitats these animals are strictly synanthropic, and this feature distinguishes *Eptesicus serotinus* from other bat species. Up to now we have found them in 13 places. Microclimate characteristics of their shelters are conditioned by the temperature of the external environment. This quite obvious dependence may be illustrated with temperature changes in shelters in the suburban areas of Martakert in spring (Fig. 1).



**Fig. 1. Thermal regime of the hiding place of the serotine bat.** 1 – temperature in the hiding place, 2 – external temperature

**Рис. 1. Температурный режим в убежище позднего кожана.** 1 – температура внутри, 2 – внешняя температура

These mammals emerge for hunting in deep twilight: between 20:30 and 21:00 hours in spring, 21:30 and 22:00 hours in summer. The duration of the flight activity comprises about 2.0–3.5 hours. The second activity period begins at 3:30 and lasts till sunrise, at 5:00–5:20. Duration of a hunting bout depends on the weather; one bout being last no longer than 15–20 minutes. Strong wind or light rain do not hinder the flights of these animals, but in case of heavy rain, they return to their hiding places. In cold spring many of them still fly even when the temperature is between +6 and +8°C, but because of the absence of insects they return to their hiding places. We failed to find them outside the shelters only when the temperature was dropping below zero.

Females that had mated in autumn or winter appeared in maternity roosts in the mid spring. In some cases, old males could occur there. The young were born within the first 10 days of June, usually two pups in each female.

Lactation lasted about 35–40 days. In captive females this period lasts 53–67 days according to E. Cranbrook (1960), 30 days according to M. Blakmoor (1963) and 40 days according to D. Kleiman (1969).

Once young become independent, nursery colonies break up, and the individuals form mixed-sex colonies.

In different populations sex ratios of young serotines are different. In 2006 in the southern populations it was 1.2♀:1♂, and in the northern ones 0.9♀:1♂; in 2008 correspondingly 1♀:0.9♂ and 0.85♀:1.1♂. The average lifespan of *E. serotinus* is reported to be 4–6 years (Stebbings 1977). From our banding data we have learnt that they may live up to 14 years (Table 1), the average lifespan being 5.3 years for males and 6.3 years for females. In populations of the serotine bat under study 1–5 year old male individuals make up 64.7%, females – 52.3%; 6–10 year old males make up 26.5%, females – 32.5%. Males aged 10 years and over make up 8.8%, females – 15.0%.

The death rate of these animals is rather high in Nagorno-Karabakh, and we have found out that nearly 30–35% of death cases occurred before the age of a month. The reason is that at this age they try to stretch out their wings and fly for the first time. Trying to fly, they fall down and die.

#### LITERATURE

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## РЕЗЮМЕ

Айрапетян В.Т., Арутюнян М.К. 2015. Экология позднего кожана (*Eptesicus serotinus* Schreber, 1774) в Нагорном Карабахе. – *Plecotus et al.* **18**: 14–18.

В работе представлены результаты исследования экологических особенностей позднего кожана в Нагорном Карабахе. Описаны изменения теплового режима укрытий, ритм ночной активности, колебания численности по годам; рассмотрены некоторые вопросы размножения.

Ключевые слова: Карабах, фауна, поздний кожан