The dynamics of the number of individuals during the breeding period for more
*L. vulgaris* and *T. cristatus* populations

Alfred-Ştefan CICORT-LUCACIU1*, Anamaria DAVID1, Olimpia LEZĂU1, Adrian PAL1, Katalin OVLACHI1

1. University of Oradea, Faculty of Sciences, Department of Biology, Universităţii str., No. 1, 410087- Oradea, Romania

* Corresponding author: A.Şt. Cicort-Lucaciuc, e-mail: cicort.alfred@yahoo.com

**Abstract.** In this study we monitored the dynamics of the number of individuals during the breeding period for four populations from two habitats. With the values we obtained, we also determined the size of each population as well as the sex ratio. The populations from the small habitat have their aquatic period shortened with 3 weeks because the water hole dries out sooner. Despite this, it houses larger populations than the larger habitat, most likely due to the road that separates the latter from the nearby forest. This forest is used by the newts as a terrestrial habitat after exiting their aquatic period. In the beginning of their aquatic period, the common newt dominates, as a percentage, the crested one simply because it can populate the shallower sectors of the water, thus the ones with earlier optimal temperatures. Males have a higher earlier percentage than the females for all the 4 studied populations. The crested newt has a greater affinity for the aquatic environment than the common one. The sex ratio for both the common newt populations is tilted towards the females while the sex ratio of the two crested newt populations favors the males.

**Key words:** *L. vulgaris, T. cristatus, dynamics, breeding period*

**Introduction**

The attempt in the last few decades to stop the decline of amphibians lead to several conservation measures being implemented. The two newt species *Lissotriton vulgaris* and *Triturus cristatus* have a protection status imposed by the Bern Convention, the Habitats Directive and the 57/2007 Emergency Government Ordinance (BERNA, 1979; C.D. 2006/105/E.C.; O.U.G. 57/2007).

The knowledge of the population sizes for amphibians is an important parameter for evaluating their conservation status and for managing it.

Studies which estimate the amphibian’s population sizes appeared in Romania only in the last years (Sas et al. 2005, 2006, 2008; Demeter & Mara 2006; Demeter & Benko 2008; Cicort-Lucaciuc et al. 2008; Covaciuc-Marcov et al. 2008, 2009).

There is only one study regarding the estimate of a newt population in Romania (Cicort-Lucaciuc et al. 2008). It is about two populations – one of common newts and the other of Danube crested newts – for which the dynamics of the number of individuals during the breeding period was monitored, then the sizes of each population were estimated and the sex ratios determined.

In a very similar way, in this study we set out to realize a study on the common and crested newt populations.

**Material and Methods**

The study took place in spring 2007. We visited the habitats chosen for this study every two weeks: March 10th, March 24th, April 7th, April 21st, May 5th and May 19th. We captured all individuals present in each habitat every time after which we counted them, dividing each species and sex. Subsequently, we released back all the newts in their habitats.

The habitats are represented by two ponds systems, situated at less than 2km from each other. The first one is near the village of Prunior and the other one near Ignesti. Both are situated close to the same forest, at an altitude of about 140m a.s.l. The differences between the two are relatively small. The first one is actually separated in two water pools of about 8-10 m², with *Juncus* bushes on the sides and with a very rich aquatic vegetation. The second habitat contains 3 pools of about 6-8 m² but presents a poorer aquatic vegetation. The latter ones dry out before the first two. The maximum depth of the water is about
The objectives followed in this research were established for each habitat: 1) the time frame in which the newts enter the water, 2) the length of the aquatic period, 3) the number of individuals present in each habitat in each period, divided in species and sex, 4) the percentage represented by this latter number from the entire population, 5) the percentage of the average number of individuals counted in all the work periods, 6) the size of each population and 7) the sex ratio.

The percentage \( P \) from the entire population \( n \) of the average number of individuals in all the work periods \( \frac{N}{t} \) has values in the following interval: \( 100/t \leq P \leq 100 \), where \( t \) is a variable (\( N \) is the total number of individuals counted in all the working periods; \( t \) is the number of work periods). This is why we will adapt the formulae for the following interval: \( 0 \leq P' \leq 100 \).

\[
P = \frac{N}{n \times t} \times 100 \quad \text{where} \quad P \in \left[ \frac{100}{t}, 100 \right]
\]

\[
P' = \frac{N-n}{n \times (t-1)} \times 100 \quad \text{where} \quad P' \in [0,100]
\]

**Results and discussions**

The breeding period of the 4 populations began in the last days of February for the habitat near Prunişor and in the first days of March for the one near Igneşti. However, in the previous study (Cicort-Lucaciu et al. 2008) the aquatic period of the two populations began only towards the end of March. The major cause of this difference is the climate particularities of the two years. In 2006, when the study from Cermei took place, the absolute average values of the temperature for March for this area were 8.6 °C the maximum and 0.3 °C the minimum. Meanwhile, 2007 had a gentle spring, with the absolute average values for March of 14.4 °C the max and 3.13 °C the minimum.

Another cause is the difference in size between the two habitats: the biotope from Cermei being a plain one, much larger than any of the ones studied here, a fact that implies a slower warming of the water from the pool (Cicort-Lucaciu et al. 2008) (Table 1).

Temperature and humidity are two of the non-biological factors that influence the most the activity of amphibians (Cogălniceanu et al. 2000).

The length of aquatic period for Urodelas differs not only for various species but also for each population (Duellman & Trueb 1986). For this particular study, the aquatic period of each population was limited by the ephemeral character of the habitats. The larger habitat dried out later.

Thus the population from Igneşti had its aquatic period during March and April while the one from Prunişor had it extended until mid-May.

In terms of length, the aquatic activity of the studied populations does not differ that much from the populations studied in Cermei (Cicort-Lucaciu et al. 2008).

The number of newts present in the habitat differs from one period to another, being influenced by the temperature and humidity conditions. In the case of both habitats, the period with the greatest number of individuals indicates that these factors had the optimum values for the hosted populations. Thus, the values we obtained on the April 7th count for the Igneşti habitat are in fact the sizes of the populations there (Cogălniceanu 1997). Equivalently, the sizes of the populations from Prunişor are represented by the numbers obtained on the April 21st count.

The habitat from Igneşti is smaller than the one from Prunişor and implicitly dries out sooner and has poorer aquatic vegetation. However, it hosts the largest population from the 4 studied (the common newt one). Further more, comparing the populations of the same species, it’s always the ones from Igneşti that are larger (Table 1).

One of the important factors that disadvantages the populations from Prunişor is the road that runs between the habitat and the woods. Despite the fact there are only 20m from the forest to the habitat, the road affects the investigated populations in at least two ways. On one side, the traffic claims victims during the migration between the forest and the water pools. This type of mortality is, sadly, frequently mentioned in Romania (e.g. Krecsák 2004; Sos 2007; Covaci-Marcov et al. 2009). On the other side, the habitat from Igneşti is located in an area where the forest tents to regrow naturally.

Thus, the populations here can use, during their terrestrial phase, a bushy sector, whereas the area near the habitat from Prunişor has a secondary grassy vegetation, affected by over-gazing.

One can always add that, gazing aside, the presence of the road itself blocked the development of a bushy layer coming from the forest in this area.
Among the two syntopic populations from each habitat, the one of the common newt was always greater. The situation corresponds to that from Cermei (Cicort-Lucaciu et al. 2008). The common newt occupies both the zone of the habitat in which the crested newt lives and the shallow parts too, where the other species can’t survive due to its larger size. This broader spatial valence is an important factor that gives a numeric advantage to the common newt.

In order to comparatively analyze the presence of the newts depending on habitat, species, sex, in the beginning or in the end of their aquatic period, we calculated for each case the percentage of the number of individuals present out of the entire population (Table 2.).

This parameter is an indicator of the population’s presence at a certain time of the aquatic period. For the beginning of the aquatic period, it can be noted that both populations from the Prunişor habitat have a greater percentage than the ones from Igneşti, that *L. vulgaris* has a greater percentages in both biotopes than its neighbor species and that the males of all the 4 populations are present in greater amounts than the females. For what the end of the aquatic phase is concerned, there appears to be no rule for habitat, species or sex. The habitat from Prunişor has sheltered the populations for a longer time than the habitat from Igneşti.

Opposed to it, the biotope from Prunişor was both populated earlier and depopulated later (Table 2.).

Responsible for creating these ecological needs is the conjoined action of more factors among which are the larger size of the biotope, the lesser ephemeral character of the water pools and the richness in aquatic vegetation and fauna.

For both habitats, the differences in percents between the two species, in the beginning of the aquatic period, favor the common newt (Table 2). Having a smaller size, it occupied the areas with shallower depths in which the water reached optimal temperatures quicker (Cicort-Lucaciu et al. 2008).

However, the most remarkable comparative aspect in the behavior of these populations for the beginning of their aquatic period is the difference between the sexes (Table 2). It’s the males that dominate in numbers the females for all the 4 studied populations, in this period of repopulating the habitats.

It is considered that this behavior is the result of the male’s territorial dispute (Jalba 2008). This behavior pattern is also verified for the case of the two newt populations from Cermei (Cicort-Lucaciu et al. 2008). In the case of the Danube crested newt from Cermei, this difference is extremely large (over 50%) while none of the cases here have such a discrepancy.
Table 2. The dynamics of the number of newts depending on habitat, species, sex and period (%)

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Conclusions

The size of the habitat influences the length of the aquatic period of the newt populations. By drying out, the water pools limit their breeding period.

In the larger habitat (the one from Prunișor) the aquatic activity of the newts lasted 3 weeks more than in the smaller one (from Ignești). The cohabiting populations of the two species did not present any differences in terms of the moment of starting or ending their aquatic phase and thus in its duration.

The size of the population is of about 191 individuals for the common newts and 54 for the crested newts in the first habitat and of about 539 and 89 respectively for the second biotope.

The road that separates the aquatic habitat from the forest (habitat for their terrestrial phase) for the Prunișor location disadvantages the populations here by exposing them to traffic and to natural predators.

The presence in their habitat at the beginning of their aquatic stage is considerably greater for the populations from Prunișor than the ones from Ignești.

It is also greater for the common newt populations in comparison to the crested newts as well as greater for the males than for the opposite sex, regardless of the population.

The presence in the habitat of the crested newt (in terms of the entire aquatic period) is greater than that of the other species indicating a more pronounced affinity for the water for *T. cristatus*.

The sex ratio favors the females in the case of the common newt and the males for the crested one, for each of the two populations of each species.

References


*** BERNA, 1979. Bern Convention on the Conservation of European Wildlife and Natural Habitats; and all further recommendations and resolutions.


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