DISTRIBUTION AND CURRENT STATUS OF THE EUROPEAN SOUSLIK
(SPERMOPHILUS CITELLUS L.) IN SOFIA VALLEY AND THE ADJACENT AREAS

V. Stefanov, E. Markova
Department of Ecology and Environmental Protection, Faculty of Biology, Sofia University
Correspondence to: Vladimir Stefanov
E-mail: vladstef@abv.bg

ABSTRACT
In the last decades the situation of the European souslik in Bulgaria is undergoing substantial changes towards reduction of inhabited territories and extinction in a number of formerly inhabited areas, which respectively changed its conservation status. At the same time, there is a definite shortage of detailed data concerning the situation of this species in many regions of the country. The present research determines the species’ situation in the study area – Sofia valley and its adjacent territories. A distribution map of the species is elaborated, and the distribution changes dating from the middle of the past century till present day are analyzed. An assessment of the contemporary population status in the study area is made, based on relative population density and on the sizes of inhabited areas. The data obtained allowed the potential risk factors to be estimated and a number of measures for monitoring and protection of the species to be proposed.

Keywords: distribution, population density, Sofia valley, Spermophilus citellus

Introduction
In the period 50s - 70s of the past century, the European souslik has been widely distributed in Bulgaria. It has been considered a pest, and active measures have been undertaken to limit its number (3, 7, 8). Due to the falling numbers and inhabited areas, in the process of preparation of the new edition of the Red Data Book of Bulgaria in 2007 (in press), it is listed as vulnerable – VU (7). The species is covered by the Biological Diversity Act of Bulgaria as a species “requiring priority conservation of its habitat” (Annex 3 to Art. 37) (1). In Bulgaria the species inhabits areas with various nature conditions and degrees of social and economic development. Having as a background the common depression of the European souslik’s populations, concrete and precise information about the species’ status and distribution in different areas is necessary in order to elaborate adequate assessment and monitoring of the species, as well as conservation actions.

The present work aims at assessing the status of the species in Sofia valley and the adjacent areas in view of its monitoring and conservation needs. Part of this work is performed within project titled “Research of the spatial structure of the European souslik in the Sofia valley and Vitosha nature park”.

Materials and methods
For the purpose of the work, the distribution of the European souslik was mapped on the bases of literature data (2, 3, 4, 5, 6, 8), information provided by field biologists, enquiring the local population, and field research. In most cases, the enquiry data received has been check-proofed on site.

Due to the lack of fixed terminology, the following terms are adopted elsewhere in the present work:

Source location (site) – a nature locality or region around human settlements, about which data is available for territories being inhabited (before or now) by sousliks.

Colony – a spatially defined territorial group which is spatially separated by other similar groups inhabiting the same region. Such groups are able to exchange specimens between each other within the local population.

Historical changes in the species’ distribution are tracked down, based on the availability of sousliks in the sites identified in comparative aspect: until and after 1985. The partitioning line (year 1985) is accepted for the purposes of the forthcoming second edition of the Red Data Book of...
Bulgaria in terms of period-based assessment of change trends of species’ distribution, where 1985 is considered as a boundary year.

The assessment of the recent status of the European souslik is made on the basis of direct field observations. A complete field exploration of the studied area has been performed in 2006 in order to clarify the species’ status in the region. The studies have been extended to the next years, too. They include a survey of the potentially suitable habitats (open grasslands – pastures and meadows, abandoned lands), precise geographic positioning of the inhabited territories with the aid of GPS units, and assessment of the relative density of the species. Field data of the authors for previous periods are used for the assessment purposes, too. The species’ relative density determination has been performed through direct count of active individuals in the maximal diurnal activity period after complete exit from hibernation and before appearance of newborn specimens on the surface.

Results and Discussion
Taking into due account the literature sources and the enquiry research undertaken, before 1985 a total of 39 source locations were identified in Sofia valley, and, respectively, 16 sites - for the surrounding mountains (Fig. 1). Undoubtedly, the souslik has been distributed in the lands of other settlements, thus forming a common regional population linked with the populations of the adjacent geographic regions.

After 1985 the species is found in just 15 cases (38.5% of the total number of territories confirmed for the region). Moreover, range fragmentation is observed. The survey of Sofia valley territory in 2005-2006 proved an availability of sousliks in only 9 out of the initial number of 39 sites (23.1%). Comparing the distribution of species before and after 1985 shows that the distribution of the European souslik across Sofia valley follows a drastic decrease in all the areas it inhabits. A similar independent analysis, performed by Koshev (9), reports a likewise result.

For the period 2005-2008, three main regions separated from each other can be defined. In two of them the species’ status is critical: these are the regions Slivnitsa-Petarch and Bogdanliya-Karapoltsi. In the third region (Lokorsko-Zhelyava), one comparatively isolated colony in the lands of Zhelyava village is identified. A significant number of colonies (at least 9) are discovered in the remaining part of the region. They feature a free exchange of specimens, and in the process of multi-annual population dynamics they merge in various degree (such a merger and partial enlargement of the inhabited areas has been observed since 2007).

It must be pointed out that in the process of the present survey, information was obtained (incl. from biologists) about specimens observed in various sites throughout Sofia valley. However, no sousliks were found by the authors in these sites. Possibly, these were resettling specimens. Another option is probable the availability of small and hardly discoverable colonies.

In the mountains surrounding the Sofia valley, the species is decreasing substantially, too. It is not confirmed for the Plana mountain within the present study. In 2000 it has disappeared from the western part of Lozen mountain. The available enquiry data shows availability of sousliks in Lyulin mountain (possibly in its southwestern part) but this was not confirmed throughout the present study. In the Vitosha Nature park the species has inhabited the southern slopes of the mountain, whereas recently it is practically found in just two site locations, plus another one under question. One isolated source location of the species is identified in the Mourgash range of Stara Planina.

A generalized profile of the current species’ status is given in Table 1.

Considering the potential threats, the status of the European souslik in Sofia valley and its adjacent areas can be assessed as critical and therefore requiring specific conservation measures. Real implementation of the Biodiversity Act is necessary, since it foresees priority protection of the souslik’s habitats together, with land use regimes, supporting favorable conservation status of these habitats. In the past, they have been extensively used for grazing which is nowadays quite limited. This results in succession processes, worsening the habitat qualities. This practically leads to extinction of the species, especially in mountain regions where the grassland habitats are still preserved. Restoration of grazing livestock farming in combination with species’ reintroduction back into its traditional habitats is one of the ways to protect it in the studied region.
Fig. 1. Distribution of the European souslik in Sofia valley and the adjacent areas

Legend:
- site locations until 1985
- site locations after 1985
- inhabited regions determined in 2005-2008
- newly colonized area
Current status of the European souslik in the studied region

<table>
<thead>
<tr>
<th>Inhabited regions</th>
<th>Number of colonies</th>
<th>Average area of colonies (ha)</th>
<th>Relative density (active specimens / ha)</th>
<th>General assessment of the status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sofia valley</strong></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Lokorsko-Zhelyava</td>
<td>10</td>
<td>6.1±2.5</td>
<td>From less than 15 up to 120 for the different colonies</td>
<td>The region is a territory of quite heterogeneous conditions. It includes abandoned lands, pastures and forests. A minimum of 2 colonies have disappeared after 2005. Shrink of the population in the eastern part is observed, together with stable enlargement in the central and western parts, whereas colonies merge and new territories are colonized, incl. abandoned arable lands. Real threat of direct extermination of habitats..</td>
</tr>
<tr>
<td>Bogdanliya-Karapotsi</td>
<td>1</td>
<td>~ 1,5</td>
<td>10</td>
<td>Isolated colony of quite limited area.</td>
</tr>
<tr>
<td>Slivnitsa-Petarch</td>
<td>4</td>
<td>6.7±3.7</td>
<td>&gt;15</td>
<td>In the past, the number was exceeding 50 specimens/ha (Penkov, pers. comm.). Two colonies have disappeared. The rest colonies are separated from each other, no exchange of specimens.</td>
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<tr>
<td><strong>Localities in Vitosha nature park</strong></td>
<td></td>
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<tr>
<td>Selimitsa</td>
<td>1</td>
<td>2.5</td>
<td>10 to 20</td>
<td>Until 2005 the inhabited area has decreased by 80%.</td>
</tr>
<tr>
<td>Village of Zheleznitsa</td>
<td>1</td>
<td>9</td>
<td>&gt;10</td>
<td>Isolated colony of quite limited area.</td>
</tr>
<tr>
<td><strong>Stara Planina mountain</strong></td>
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<tr>
<td>Peak Mourgash vicinity</td>
<td>1</td>
<td>60 (core area is 10 ha)</td>
<td>20 to 30</td>
<td>Stable colony. However, succession processes are worsening the habitats’ quality.</td>
</tr>
</tbody>
</table>

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