

RESTORATION OF THE EUROPEAN GROUND SQUIRREL IN KOTLENSKA PLANINA

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Abstract: Based on questionnaire data, European Ground Squirrel is considered extinct in the region of Kotel town (Natura sites Kotlenska planina BG0000117 and BG 0002029) since 1990. In 2011, the Fund for Wild Flora and Fauna started a program aiming at restoring the European Ground Squirrel. The program implementation is based on assessment of the regional conditions (physical-geographical mosaicity of the landscape and habitats' conditions incl. dependence on the degree of development of pasture livestock breeding) and, on this basis, a reintroduction of the European Ground Squirrel in territories found suitable for its existence. In 2011 and 2012, a reintroduction of European Ground Squirrels (64 and 56 individuals, respectively) was carried out in two adjacent localities around acting shepherds and a dairy farm. The data obtained in the subsequent monitoring of these places showed that the animals successfully bred and, generally, in both localities a colony was formed inhabiting a total area of 3 ha. In the period 2013-2014, the boundaries of the inhabited territory were relatively constant, while in 2015 settlement and breeding has expanded to a new territory, covering an area of about 1 ha.

In the same year, the assessment of habitats showed significant improvement of the existing conditions for European Ground Squirrel on a large area of pastures as a result of increased number of grazing livestock. The change of the conditions and the success of the initial experiment justified the implementation of a second reintroduction into a new habitat being relatively distant from the first settlement. A total of 44 animals were reintroduced during the second experiment. If the repeated reintroduction is successful, it can be argued with a high degree of certainty that the core for restoration of a viable population of European Ground Squirrel in the region has been successfully established.

INTRODUCTION

During the last decades, the distribution and abundance of European Ground Squirrel (*Spermophilus citellus*) has significantly decreased, mainly due to loss and fragmentation of habitats and, according to the IUCN criteria, the species has been categorized as “vulnerable” (Coroiu et al., 2008; Stefanov, 2015). Habitat management and reintroduction in areas where the species has disappeared have been indicated of basic significance among the conservation activities in Action Plan for the Conservation of the European Ground Squirrel *Spermophilus citellus* in the European Union (Janák et al., 2013), as far as these are associated with the development of cattle pasture and the conservation status of semi-natural grasslands and meadows.

Based on questionnaire data, European Ground Squirrel has been considered extinct in the region of Kotel town (Natura sites Kotlenska planina BG0000117 and BG 0002029) since 1990. This was obviously due to the drastic reduction of grazing cattle and the subsequent successional changes in the habitats. Since 2000, the Fund for Wild Flora and Fauna has launched a complex of activities including traditional ways of cattle grazing, protection and restoration of habitats and species diversity in semi-natural grassland systems, where one of the priority species is European Ground Squirrel.

The region is mountainous and includes significant areas occupied by grasslands, but is relatively isolated from similar areas covered by forest massifs. For this reason, it is not expected that a natural colonization of the territory by European Ground Squirrel will take place in the foreseeable future. Even under favorable conditions, the existence and restoration of the species is only possible through reintroduction. This is why a program aiming at restoring European Ground Squirrel populations in the region started in 2011 (Stoynov et al, 2013).

The present publication summarizes the results of the program implementation achieved to date.

MATERIAL AND METHODS

Reintroduction was carried out following the general approach (Brandler et al. 2012; Dejkin and Tihonov, 1987) using the following scheme:

- exploration of the area and assessment of the habitats condition;
- choice of habitats with conditions suitable for the species;
- translocation;
- subsequent assessment (monitoring) of the habitats condition and the reintroduced animals.

The ultimate goal of the restoration was the creation of several spatially distributed local colonies, so that the future expansion and colonization of new areas could ensure the exchange of individuals and, accordingly, the formation of a sustainable and viable population.

The assessment of habitats was mainly based on the degree of development of grass cover (height and projective cover of the grass stand) as a factor being a subject to management and directly dependent on the degree of development of the cattle pasture. Along with this, the characteristics of the terrain, slope, water regime, and soil layer depth were taken into account.

Areas featuring relatively weak slope, depth of soil layer 60-80 cm, height of grass cover under 15-20 cm. and projective cover below 80% were accepted as appropriate habitats.

The reintroduction was carried out according to the methodology and practical experience described by Hapl et al. (2006) and Matějů et al. (2010), at a time when individuals born in the current year switched to independent living, and adults had not yet entered hibernation. Animals were trapped alive and released in new habitats, with pre-dug holes with tunnel length of 60-100 cm and a diameter of 5 cm.

On overall, three reintroduction sessions were carried out in 2011, 2012 and 2015, respectively, with 164 animals trapped and released in total (Table 1).

Table 1. Number, gender and age composition of the introduced European Ground Squirrels

Reintroduction		juv			ad			Σ
Year	Coordinates (WGS 84)	♀	♂	Σ	♀	♂	Σ	
2011	35 T 456246 4752643	24	19	43	12	9	21	64
2012	35 T 456081 4752391	18	19	37	9	10	19	56
2015	35 T 456818 4751358	22	17	39	3	2	5	44

The assessment of the number and territory inhabited by European Ground Squirrel was based on the number and location of inhabited holes. The populated area was determined by the aggregation of final inhabited holes located in less than 50 meters apart.

RESULTS AND DISCUSSION

For the reintroduction taking place in 2011-2012, a region of a functioning sheep farm with an area of 30 hectares was chosen, where regular livestock grazing is carried out to guarantee the maintenance of the necessary grass cover conditions.

Observations of the European Ground Squirrels reintroduced in the abovementioned period showed that animals reproduced successfully, but mainly

inhabited the areas where they were initially placed (Stoynov et al., 2013). The presence of single holes and observation of single animals showed that individuals were displaced outside the colonies but their number was insufficient to form a colony on the new territories until 2014. The maximum recorded length of displacement was about 500 m from the observed colonies.

Observations conducted in 2015 determined that two colonies have been formed in the sites of release with an area of 0.5 and 2.4 ha, respectively. The distance between the borders of the two colonies was about 200 m, as they were separated by dense fern overgrowth. Nevertheless, there was an apparent exchange of individuals between the two colonies through the dirt road connecting them.

Based on the number of occupied holes, the relative number of the European Ground Squirrels in both colonies showed no significant differences through the years. In 2015, in the period immediately after hibernation, 68 and 15 holes were reported in the two colonies, respectively, which did not practically differ from the data obtained in 2013. The density was estimated at no more than 5-10 ind/ha. Despite the relatively moderate density of the colonies in 2015, it was established that a resettlement of a new territory has taken place in May, with an area of about 1 ha, where seven individuals were observed. Considering the location of the temporary single hole outside the permanently inhabited areas, the animals had moved from two areas. On the newly settled area, young animals born in July of the current year were also observed, suggesting that a new colony has formed in this area.

In general, the reintroduction of European Ground Squirrel can be considered successful at this stage. It allows to proceed, insofar as possible, with the establishment of colonies in new areas. In this regard, favorable conditions for the period 2011-2015 increased the number of grazing livestock: sheep, goats, horses and cattle. In 2011 the pasture load was 0.5 animal units/ha, while in 2015 it already reached 3.2 livestock units/ha. In 2015 respectively, the investigation showed significant changes in the grass cover on large areas: in average, the grass height for the spring-summer period was 10-15 cm (60-80 cm in 2011) and the projective cover was about 80% (up to 100% in 2011). Seven habitats suitable for reintroduction of European Ground Squirrel were identified in these areas, at an average distance of 500 meters from one another and from the already formed colonies.

In 2015, European Ground Squirrels were introduced over an area of about 1 ha in a habitat with coordinates 35 T 456818 475135844. Subsequent observations have shown that practically no animals have settled permanently in the artificial holes available. Animals have scattered across the surrounding areas, and the maximum recorded distance was about 100 m away.

The initial leaving of the artificial holes is a natural phenomenon and is attributed to the research activity of the animals, unfamiliarity with the territory and relocation stress. Nevertheless, during the investigation done within a month

after the reintroduction, new holes were found (inclined and vertical). It was generally estimated that at least 4% of the animals have settled in a region within a 100 m radius of the center of reintroduction. The final effect of the reintroduction will be clear only after the hibernation period in the spring of 2016.

CONCLUSION

On overall, it can be noted that at this stage the recovery program of European Ground Squirrel in the region of the town of Kotel has allowed the successful establishment of local colonies and conditions for extending the reintroduction efforts have been created, with a real prospect for recovery of a viable population of this species. Achieving the ultimate goal will provide a food base for a number of species whose recovery is linked to trophic relations with European Ground Squirrel, thus supporting the restoration of the biodiversity of the region. Meanwhile, the experience gained so far allows deriving conclusions regarding the methodology of the reintroduction of European Ground Squirrel.

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